THE TRADE REVIEW

AND WESTERN MACHINIST.

WEEKLY EDITION, Vol. XVI—No. 28. } CLEVELAND, O., JULY 14, 1883. { MONTHLY EDITION Vol. I.—No. 7.

New Machinery.

A New Mortising Machine.

On Sept. 4, 1877, Letters Patent of the United States were granted to Wm. Green, Jr., for a new construction of mortising machine. The invention consists of a revolving endless chain-saw, formed of pivoted sections or links with cutting teeth, to which the proper tension is imparted by a grooved tension bar, the wood being fed and guided to the mortising-saw by a movable treadle-acted bench or table. Several important difficulties were met by the inventor and never overcome by him; but in the hands of the National Mortising Machine Co., aided by money and mechanical skill, the machine has developed into a first class and perfect piece of mechanism.

The railroad car shop machine (No. 1) has a table with two movements, forward and back, and right and left, so that any required adjustment of the wood to be mortised may be obtained. The saw is fed by turning the wheel on the right of the head, thus letting the tool down into the wood as it rests on the table. Weight of No. 1 about 1,500 lbs.; price $500.

The small machine (No. 2) for general use in wood-working shops, has a movable iron table which is raised and lowered by using the foot lathe, thus feeding the saw from below. A speed of from 1,500 to 2,000 revolutions per minute is required of the carrier of the chain saw. Weight of No. 2 about 450 lbs. Price $200.

The mortisers are manufactured in the U. F. & Pullman Car Wheel Works, where first class workmanship is secured and stisfaction guaranteed. These machines, it is claimed, will do three times the work of any chisel mortiser. For further information address the National Mortising Machine Co., Chicago, Ill.

Varnish for Foundry Patterns and Machinery.

A varnish has been patented in Germany for the above purpose, which, it is claimed, (we do not know how justly), dries as soon as put on, gives the patterns a smooth surface, thus insuring an easy slip out of the mold, and which prevents the pattern from warping, shrinking, or swelling, and is quite impervious to moisture. This varnish is prepared in the following manner:—30 lb. of shellac, 10 lb. Manila copal, and 10 lb. of Zanzibar copal are placed in a vessel, which is heated extrenally by steam, and stirred during four to six hours, after which 150 parts of the finest potato spirit are added, and the whole heated during four hours to 87 deg. C. This liquid is dyed by the addition of orange color, and can then be used for painting the patterns. When used for painting and glazing machinery, it consists of 35 lb. of shellac, 5 lb. of Manila copal, 10 lb. of Zanzibar copal, and 150 lb. of spirit.

In cases of externally fired boilers many must have noticed the snapping and bubbling sound at the bottom, after pulling down the fires with a strong draft on, prior to blowing down. This is due to the "mud" (organic and inorganic substances) which has settled during the night, while the boiler was losing heat on the lower side; the water becoming comparatively quiet on the inside. Under such circumstances the boiler may be compared to a pot of boiling mush. The steam bubbles are made at the bottom, underneath the mass of mud, and when sufficiently buoyant, come in contact with the colder water above, and are condensed, forming a snapping noise in collapsing. This never occurs in a clean boiler, with comparatively pure water.[—N. W. Williams.

AN INGENIOUS CALCULATION.

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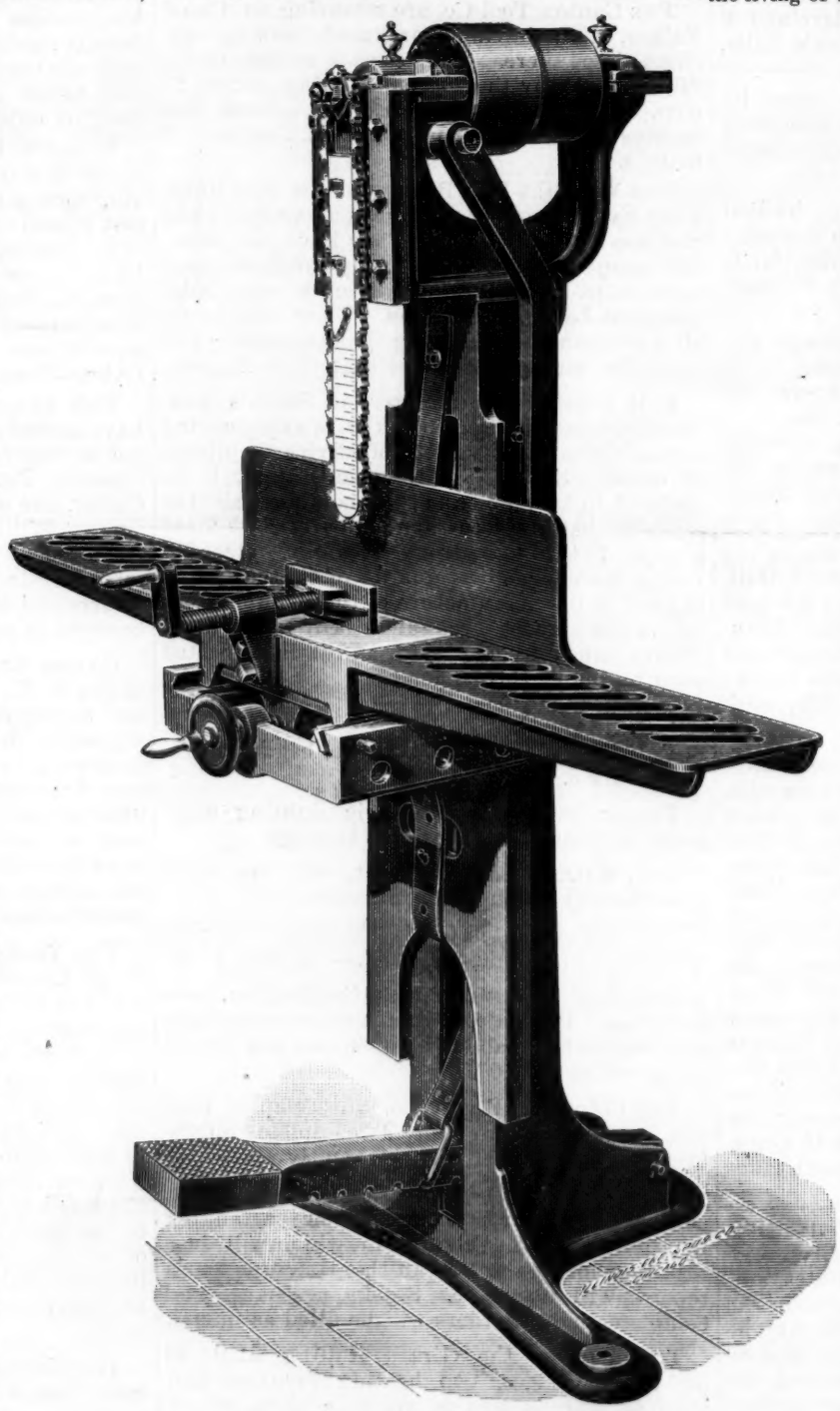
Population of Motive Power in Ohio and the United States.

Ohio's share of locomotives is nearly 2,000. Counting a locomotive as capable easily of running twenty miles per hour, with a mean piston pressure of fifty pounds per square inch, the horse-power developed by the locomotive will be about 250. On good authority we find it stated that a horse is able to do the work of about ten men. From these figures it appears that the 2,000 locomotives of the State are equivalent to a population of five millions of people—nearly twice the actual population of the State. If we add fifty per cent. for the motive power employed in the manufacturing interests of the State, we have a motive power equivalent to a population of over twice the actual population for the State of Ohio.



NEW MORTISING MACHINE—No. 2.

If the people of the State enjoy the benefits derived from this motive power of the State, then it may be stated—startling as it may seem—that we actual residents of the State enjoy the living of a threefold population; that is to say, the three million population enjoy the living of this three million, and of the motive power equivalent of six million; or, in all, nine million.

Applying the same process to the United States, gives us in actual and equivalent population, 150 millions, the living of which is enjoyed by the fifty millions of actual population. Some may object to this as unfair, from the fact that locomotives are much of the time idle. But a careful observer will perceive that men are not always at work either, the relative portions of rest being not far from equal. Indeed, when we consider the wasting of life and living by men, the motive power equivalent will be found ahead. Locomotives are not responsible for drunks, strikes, mob violence and bumming.

But how are fifty millions to enjoy the living of 150 millions?

Imagine our motive power blotted out for ten years, and write down the answer. Is not our present living fast in comparison? Do not we owe much to motive power for our pleasant homes, in country or city, and particularly for our present comfortable modes of travel? The beautiful works of art in our homes are made both beautiful and cheap by mechanical production, the latter being only made possible by the driving force of motors.

For instance, suppose a Columbus citizen learns that a trade may be made in Cincinnati by which $5,000 may be realized. A night's trip in a Pullman car lands the citizen in Cincinnati early, and by ten o'clock the trade is made. A first-class hotel and the sights of the city can be afforded for the remainder of the day, and a Pullman back to Columbus. The trip has cost but one day out. But without locomotives, and in the old way, the $5,000 opportunity probably would not be heard of. If, however, it were, then a nervous trip of several days with wagon and muddy road would quite likely find the buyer in Cincinnati too late; the bargain was closed with another two days before. No sights or first-class keeping can be afforded. The disappointed citizen returns through storm and wind, ruminating his fate, seven days out, to find business at a standstill at home.

Which of the two enjoys the most living in seven days? Is not this eminently mechanical age, an age of great living?—[Prof. S. W. Robinson of the Ohio State University, in Cin. Artisan.

Another Great Tunnel Projected.

And now it is proposed to join England and Ireland by a tunnel. The distance by way of the small island on the coast near Port Patrick, is nearly fourteen and a half miles. It will be an immense advantage to Ireland to be connected directly by railroad with England, and, of course, still greater advantage if the tunnel under the British Channel is ever constructed.—[Demorest's Monthly for August.

Manufactures.

CLEVELAND.

BOWLER & Co. have an order for wheels for 150 railroad cars.

THE present daily average of the Cleveland Barb Wire Fence Co. is a carload of fencing.

THE Hull Vapor Stove Co. have lately brought out a soldering furnace for tinners.

THE assignment of the Silver Metal Co. is announced. Assets, $6,168.44; liabilities, $11,944.13.

WITH a good local trade, the Excelsior Machine Works are now giving steady employment to 20 men.

TWENTY-TWO hours a day are now being made by the Walker Manufacturing Co., two turns of men being worked.

THE Dangler Vapor Stove & Refining Co. are making a big run on a new Coal Oil Torch and Soldering Furnaces.

THE Union Rolling Mill Co. have closed down their mills, on account of repairs and dull times, to remain closed until autumn at least.

THE Cleveland Paper Co. are trying to secure a switch on the new Pittsburgh, Cleveland & Toledo Railroad to their mill at Munroe Falls, Summit County.

BUSINESS is reported quite dull at present by the Standard Rivet Co. They had been busy all the Spring until last month, largely engaged in making bridge and bolt nuts.

THE first steam stamp ordered by the Belt Copper Mine (Limited), an English company operating near Ontonagan, Lake Superior, is being shipped by the Cuyahoga Steam Furnace Co.

IN their specialties, frogs, crossings and switches for railroads, and Luehrs' patent bolt cutters, headers, pointers, and nut tappers, and all kinds of nut and bolt machinery, the Novelty Iron Works are working along steadily. Among their most popular machines is the double-header Acme bolt cutter, which by the aid of a boy can cut 2,000 bolts per day.

BY the recent sale of their present site in the 18th Ward to the Cleveland & Pittsburgh Railroad, Messrs. Wright & Knauff, of the Cleveland Diamond Fire brick Works, have been fortunate enough to secure one much larger and more desirable, with shipping facilities by two roads—the C. & P. and N. Y. P. & O. The work of removal will begin at an early day.

THE Globe Oil Co., 438-444 Canal street, have lately purchased real estate in Minneapolis, Minn., on which they are now erecting branch works. They also have a branch at Duluth from which point they supply their Lake Superior trade, and another at Grand Rapids, Mich. They employ over 40 men. Among their leading brands are "French Valve Cylinder Oil," "Extra Globe Engine Oil," "Lardoline," etc. They also manufacture the "Diamond Black Leather Oil." Among their regular customers are Rand, McNally & Co., Chicago, the Pullman Palace Car Co., Ft. Wayne Electric Light Co., St. Paul Electric Light Co., and many others. The leading members of the company are Messrs. Charles A. Wales and Charles H. Gardner, whom the Chagrin Falls Exponent takes pride in calling "old Chagrin boys."

IT may not be generally known, but it is a fact that the works of the Cleveland City Forge Co. are the largest in the United States, and second to Krupps, which are the largest in the world. The American Manufacturer says: The building, under one roof, is 800 ft. long and 80 ft. wide. There are 15 steam hammers, the smallest of which strikes a blow of 1500 pounds; the largest is a Jumbo, and comes down with a force of ten tons. These hammers are used to shape car axles, shafts and cranks for steamers, and locomotive frames. There has just been received and placed on its foundation a lathe for finishing shafting, which was built in Scotland. The lathe will fihish 43 feet and swing 5 feet. Its weight is 56 gross tons. A boring machine, built in Philadelphia, is being placed; its swing is 16 feet. There is also a slotter with a stroke of 30 inches. The amount of finished work turned out is enormous: 400 car axles, 50 tons of couplings, links and pins, from the rising to the setting of the sun, and an occasional shaft weighing 40 tons when finished. This firm employ 400 hands running single turn. The officers are: Capt. R. H. Harman, president; L. M. Coe, vice president and manager, and G. F. Ely treasurer and secretary.

CANTON.

BY A TRAVELING CORRESPONDENT OF THE TRADE REVIEW.

EBERSOLE & KAILEY report business as fair. They make a specialty of light machinery, models of all kinds and gearing for patterns or machinery.

THE Canton Spring Works have all the orders they can possibly fill, are employing a large force of men and are turning out a first-class spring.

THE Canton Saw Works are quite busy manufacturing their celebrated hay and band knives. These knives are recommended as the easiest and fastest cutting, of any in the market.

THE Belden Burner Co. are very busy at present. They are going to double their capacity this Summer, adding more valuable machinery, an addition to their present building, etc.

THE Canton Tool Co. are removing to Canal Fulton, they having purchased mowing machine shops there. They expect to get under full headway by the 20th, employing about 25 men. Their specialties are coal miners' and masons' tools, also hammers, drills, sledges and wedges.

THE Wrought Iron Bridge Co. are very busy. They have a number of large contracts on hand that are not quite filled. They have ten erection gangs at work putting up bridges they have made. They are putting up a very large bridge at La Grange, Texas. They are using all American iron beleiving that the tensile and expansive strength is better than the English.

F. B. SMITH, manufacturer of Smith's new improved patent force sprinkler, is experiencing a great demand. In variety of service, simplicity of construction and ease of operation, it is claimed to have no equal. It combines all the features that are necessary for a first-class force pump. It throws a strong stream of water 30-feet or more. The best quality of charcoal zinc is used in the manufacture of these pumps for which the highest mechanical skill is provided. Thirty hands are employed, and it is expected soon to double the capacity.

OHIO.

THE King Varnish Co., Akron, began operations July 5.

THE project of a local electric lighting company in Springfield has fallen through.

DAY, WILLIAMS & Co., Kent, will run their glass factory through the Summer.

THE Barber Match Co. is shipping immense quantities of matches in bond.—[Akron News.

THE Hoglen Brothers' Pulp Co., Dayton, have assigned. The liabilities of the company are understood to be about $40,000, and the assets are given at $12,000.

THE Columbus Buggy Co. now employ over 800 hands, and turn out a complete buggy every eight minutes. They recently placed an order for 6,500 sets of carriage forgings.

THE East Liverpool potteries are arranging for their usual July shut down, which will last this year for two weeks. In this time the year's repairs will be made. Stocks are large and complete, and all orders will be filled as usual.

THERE are in the Girard Rolling Mill 19 puddling furnaces, two heating furnaces and three set of rolls and a machine shop, about 150 hands are employed. The company are turning out about 300 tons of finished iron per week.

A string of six cars were loaded today at the Akron Fire Brick Co.'s works, says the Akron Beacon, with fire brick for an extensive new pottery at Redwing, Minn., to be followed by relays as fast as the work demands and the shops can supply.

THE Hays Steel Works of Coshocton, are running a force of 85 hands in the manufacture of steel axles and springs. They have entirely rebuilt since burning out last December. The steel used is made in Troy, N. Y., expressly for them. Capacity 150 set of axles, 50 pairs springs per day.

THE Akron Stoneware Co. is doubling its capacity.—The Buckeye Works here and in Canton have been running full time for several weeks to fill orders. Earlier in the season there was a slack period, when the crop outlook was so unfavorable. But early in June a reaction took place, and the season's trade in reapers, mowers, threshers and engines will be very satisfactory.—[Akron News.

THE Youngstown Car Works are employing 200 men and have orders several months ahead on its books.—The Morse Bridge Works are running extra time in all departments in order to complete contracts. This week they received the contract for building an iron bridge at Columbus, Ind., to cost $30,000, and are engaged in erecting the Lanterman bridge over Mill creek.—[Youngstown News-Register.

MR. ALFRED F. SMITH, of Salem, is making a specialty of the manufacture of copper-coated spun zinc work used in the construction and ornamentation of galvanized iron cornices. By his process the zinc is thoroughly protected from corrosion by the action of the atmosphere, acid oils used in painting, etc., adding considerably to the durability of this material when used on outside work.

WEBSTER, CAMP & LANE shipped some $7,000 worth of machinery to the Lake Superior region during the past week.—J. H. Riddle has just placed in position in his brass foundry one of the neatest little engines in the city. It is 12 horse power with cylinder 7x0 inches, and is from Mr. Riddle's own design and manufacture. It is finished in excellent style and runs with an evenness and ease that are charming.—[Akron Beacon.

THE Akron Cutlery Works in the Sixth ward, have passed into the hands of Col. A. L. Conger as receiver by virtue of proceedings in the Common Pleas Court, began by William H. Carter, one of the members of the company, against William W. Alexander and Robert J. A. Boreman, plaintiff's parners. Partnership misunderstandings are the alleged cause. It is understood that these proceedings have been brought to secure a reorganlzation of the firm.

GALION Sun-Review: Everything is booming at the N. Y., P. & O. shops. A new wheel press and boring machine has just been put in, designed for dressing car wheels. Heretofore all that work has been done at the Kent shops. A new flue welder has also been put in. This additional machinery has added additional workmen, and within the past month 60 new men have been added to the pay-roll, 40 of whom are employed in the shops and the rest at different points on the third and fourth divisions.

THE Youngstown correspondent of the National Labor Tribune says: Judging by the way the mills are being run in this section of the country, the iron business is not in a very prosperous condition at this time, and in my opinion it would be for the best interests of concerned if the national convention would devise some means to restrict the output, either in making four heats of 500 pounds a turn's work, or if that should be thought too radical a change, let them reduce the weight of the charge to 450 pounds and still work five heats. And of course the same rule should apply to the finishing mills in the number of heats worked, and the amount of iron turned out for a day's work.

THE Youngstown Malleable Iron Co. having more than doubled their capacity during the last year, are now prepared to make contracts for refined malleable iron and steel work almost without limit. The vigor and perseverance with which the business has been carried on the past year are an earnest what these men mean business every time. In the line of specialties of saddlery, hardware, etc., they stand A 1, and their work cannot be surpassed. The special snaps manufactured by them are claimed to be superior to any in the market. Situated as they are in the midst of the iron district,

[Continued on Page 12.]

DEFECTS IN STRUCTURAL CASTING.

SOME PRACTICAL THOUGHTS ON A SUBJECT OF GENERAL INTEREST.

How Clean and Sound Castings May be Obtained.

BY THOS. D. WEST. *

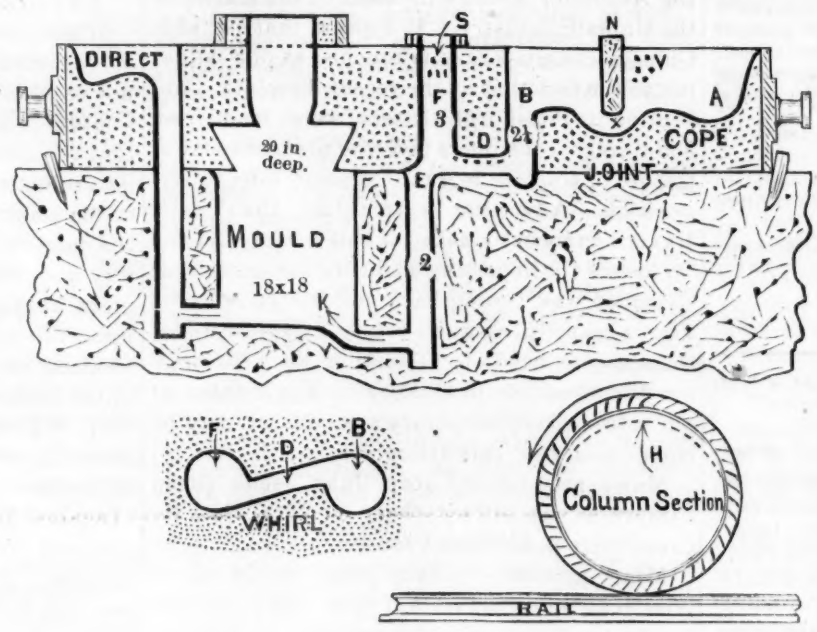
The value of sound castings in structural work is best comprehended by those who have suffered losses through their defects. Formulas and tables upon the limit of elasticity, compression and tensile strength of cast iron might often be called factors of faith; for, did the mechanical engineer know how low his factor of safety is brought throush defectiveness, he could not help acknowledging that many massive structures are built more by faith than by facts. And while there are a great number of well ascertained facts and definite laws for the guidance of those engaged in construction, there are often defects caused through ill manipulation and designs that would seem to make structural formulas and tables but a starting point for guesswork. In the investigation of cast iron, structural or machine accidents, it is rarely the case that the work is found imperfect through its design. The verdict generally given is, weak and cheap material, or defective workmanship. Castings for structural and machine building, where an injury to them would more or less be apt to cause the loss of life and property, are as a class what engineers are required to deal with, and often stake their reputation and welfare upon. As a chain is no stronger than its weakest link, so is a casting no stronger than its weakest defects. Almost every casting made is weaker in some parts than in others, not necessarily so through design, but often through natural causes that in some cases might be avoided through the aid of practical experience and skill.

Heretofore foundries have generally been looked upon as nothing but dumping holes for blockheads, dirt and pig iron. There is no question but that we have them all; but I can safely assert that in many of them there is labor that is worthy of the mind study of our brightest engineers. Because work is dirty, it is no sign that a thick and muddy brain could do it, or that there is no field for thought or study.

The defects in castings are due to many causes, some of which are generated outside as well as upon the inside of foundry walls. Those outside could be classed under the head of *design* and *competition*; inside, under the head of manipulations of *mould* and *metal*. Competition is often detrimental to the production of sound structural castings, for the simple reason that the work is taken too cheap, thereby not allowing the lowest bidder enough margin to spend for good material and labor. In this might be seen one of the reasons why the engineer should familiarize himself with the workings af a foundry, in order that he may be able to correctly judge what different classes of castings are worth in dollars and cents to manufacture. As a general thing, structural castings cheaply bought are cheaply made, and may answer for a time; but their steady employment will sooner or later result in ruin and disaster.

With reference to the designing of structural castings, the draughtsman's and pattern-maker's work is often a large factor in the procuring of clean and sound castings. This subject can better be understood and taken up by the following discussion of mould and metal. Every structural casting contains more or less dirt. This dirt is generated from the mould's surfaces and the metal's impurities. The amount of dirt a filling mould will collect depends mainly upon three things, the first being the moulder's ability to properly make a mould; the second, the shape and size of a mould: third, the style and manner in which the mould is poured and gated. The injury or weakness that dirt will cause a casting depends upon its bulk and where it is lodged. There are some castings in which certain portions can contain more or less dirt, and still not materially impairing their strength for the purpose intended. The best judge of such defects should be the engineer himself. Now, if this be the fact, it does seem but a step further for the engineer to acquaint himself with the practical moulding of any special job, and thereby cause arrangements to be provided whereby the moulder could often be assisted in having receptacles or parts that would catch and hold the dirt in such places that little or no injury could result therefrom.

It would be an impossibility to here give any data that could be used as a standard for the procuring of every casting clean and sound, as what might work well in one case would seldom do for another. However, there two or three points that, if explained, would show principles that might often be applied to greatly assist in the cleanliness of castings, and also give to the novice an idea of means used for collecting the impurities of the metal before it enters the mould. In pouring a mould the tendency of all dirt or material, whose specific gravity is lighter than the iron used, is to float or rise toward the surface of the metal. This fact is often taken advantage of by what foundrymen call a skimming gate. To fully show its form and principle the accompanying sketch is given:



At A is what is commonly called a basin. Into this the iron is poured and the basin filled as soon as possible. At K the arrow represents the metal flowing into the mould. Now it is very evident that with having the basin kept full the metal in the riser, F, should be about on a level with that in the basin. The iron that runs into the mould being taken from the bottom of the liquid metal, as represented at E, it must necessarily be free of impurities that by reason of gravity have risen to the surface, as shown at D and S. While this explanation is only to give an idea of the principle, it might be well to state that the principle is used in a variety of forms in order to suit different moulds and conditions. The value of skimming gates is often lost through the moulder not using judgment in making the gates or runners, B, F and E, of a proper relation to each other. F should always be the largest, in order to have room for dirt to rise. B should be larger than that shown below E. If E was larger than B, it would be a difficult matter to keep the dirt from passing into the mould, for the simple reason that E would take iron faster than B, thereby not allowing the basin and heads to be kept full, which must be done, in order to collect and hold the impurities as shown. The gates or runners, B, F and E, are supposed to be round, and the sizes shown represent about what relation to each other skimming gates should bear. The sketch marked "Whirl" shows one of the rinkles sometimes used. The connection D, if cut from B to F, in the manner shown, will cause the metal to whirl in F thereby causing the impurities to rise as shown at S. The greater the whirl the better the results. Another plan sometimes practiced to catch and hold impurities from going into a mould is as shown at N. This is commonly called a skimming core. It is built or set into the main basin from 2″ to 6″ lower than the reservoir bottom. Below this core is made a basin as shown at X. When this basin is filled with metal the dirt is held as shown at V, and the clean iron flows through at X. The amount of dirt or impurities that a well-contrived skimming gate or basin will gather and keep from going into a casting is often remarkable. The section marked "Direct" shows the method ordinarily practiced in which there is nothing to prevent the dirt or impurities from passing into the mould except what is held up by the keeping of the basin full of metal while pouring. I should like to have here treated upon other forms of gates and runners in their relation to special forms of castings, but as my time to even prepare what I have was very short I will have to dispense with much that should be brought out in order to fully discuss such a subject as the title implies. It is not intended to here convey the impression that by having a well-formed skimming gate the casting is sure to be free from defects. In some cases where the making of the mould is in the hands of a first-class moulder it might be so; but as a general thing the skimming gate is but a small factor; about all that can be said of it is that it aids in collecting the impurities of the iron.

The engineer has other impurities that he often needs to be more watchful of than those of iron, which impurities might be called the impurities of the mould, consisting of scabs, blowholes, cold shuts, misplaced cores, improper feeding, &c. Any one of these could form a hidden defect that would reduce a casting's strength to one-twelfth of what should be its ultimate working load, and might greatly exceed that, going from the twelfth to the twentieths. Such defects cannot be bridled with mathematics of any form; they are infinite, treacherous and beyond human reason to define. A scab is part of the mould's surface flaked off, the depth of which varies from 1-16″ up to 6 inches. When a scab is over one inch in thickness there will generally be more or less visible blowing. Sometimes this mould or casting blowing will become so violent as to tear a mould all to pieces, thereby sometimes making the exact form of the intended casting unrecognizable. Such defects as this will, as a general thing, leave but little doubt as to the casting's future use; they being too apparent to deceive must necessarily be introduced to the scrap pile.

When a mould scabs, the sand mingles with the iron, and some of it may be visible while some may not. The sand being specifically lighter than iron, it naturally rises until stopped by contact with cores or the mould's surfaces. This is a point in designing castings that should be remembered, as with this in mind the sections that are liable to confine or catch dirt might often be made thicker than the proportion design would call for, thereby allowing for a reduction in strength. To further convey this idea I would call your attention to the sketch of a column section. As a general thing, and in fact I never saw or heard differently, columns are wanted to be of an even thickness all around. I remember some 20 years back of inspectors testing a lot of columns—they might have been pipes, but whether so or not the principle involved is the same. The shop where their inspection or testing occurred was at the Portland Locomotive Co.'s Works Foun-

[Continued on Page 7.]

* A paper read before the Civil Engineers' Club of Cleveland, July 10, 1883.

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ESTABLISHED 1867.—SIXTEENTH YEAR.

Devoted to the Manufacturing, Scientific, and Mechanical Interests of the Country.

PUBLISHED EVERY SATURDAY.

Office—Rooms 30 and 31, Board of Trade Building, 122 Water street,

CLEVELAND, OHIO.

TELEPHONE 852.

WILSON M. DAY, - - - - - - - Editor.
FRANK N. CARTER, - - - Business Manager.

SUBSCRIPTION, (POSTAGE INCLUDED), { Weekly $3.00 per Year. Monthly 1.00 per Year.

☞ Advertising Rates Furnished on Application.

Entered at the Post Office at Cleveland as second-class matter.

To Machinists, Manufacturers and Others.

THE publishers of the TRADE REVIEW solicit items of information concerning manufacturing and other establishments in any part of the country, and all such items will be promptly inserted in these columns, free of charge. Facts are the only things needed; and all communications should be accompanied with the name of the contributor—not for publication—but as a guarantee of good faith.

Manufacturers, machinists and engineers are particularly requested to communicate any matters of interest relating to their specialties. No one need be deterred from sending any interesting facts in his own language, as all such contributions will be properly revised before sending to press.

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LOCAL TAXES AND MANUFACTURING GROWTH.

Of a piece with the unwise exercise of municipal authority in the direction of granting immunities to new manufacturing projects is that equally short-sighted one, excessive local taxation. Mayor Herrick, of Cleveland, in his retiring message, put the case strongly and truthfully when he said that high taxes would have one of two effects: either they would drive out manufacturing concerns, or they would prove a constant temptation to manufacturers to conceal and misrepresent their taxable property. Unhappily the cases in illustration of this point are far too numerous to need emphasizing. Too often the taxes assessed upon a firm or company quite consume the narrow margin of profit which close competition in their line of trade imposes upon them. What is the natural result? Men of conscience will not long continue in business in such a community, while men less scrupulous in this respect will retaliate upon what they consider an imposition upon them by using every device at hand to escape paying the full tax assessed. How is it with Cleveland? While this city affords unparalleled manufacturing facilities in many directions, it is an unpleasant fact that our tax rate is much higher than it ought to be. We know of at least one extensive concern that desired to remove from Philadelphia to this city but upon learning that the tax rate was about 2½ per cent. quickly abandoned the idea, thus losing to Cleveland a new plant of $100,000 to $150,000 and a small army of 200 men, with their families. Of what advantage is cheap fuel to such a concern when weighed against burdensome municipal taxes? We do not say that Cleveland is any worse in this regard than many other cities, but it is certain that she is not as well off as many other, notably Philadelphia, and it is the part of wisdom for our local legislators to take cognizance of the fact in making up the pending municipal levy. As the system of taxation in industrial communities is unwise so is the valuation of taxable property too often unfair and farcical. We quite agree with a Cleveland business man who, in a recent conversation upon this subject, expressed the decided conviction that assessors should be paid a stipulated salary and hold office by the year. Then the work of getting at the true value of property would not be hastily skimmed over in the few weeks allotted to it (which may do well enough in rural communities), but would extend over a twelvemonth, enabling the assessor (who should be a well posted business man) ample opportunity to cover the field thoroughly and impartially. The listing of all property that ought to be on the grand duplicate and its equitable valuation, coupled with wise local legislation, would be the surest remedy to the present evil. Will we ever live to see it?

TINTINNABULATION OF THE BULLS.

Again it becomes our painful duty to take the *American Artisan* in hand in the matter of the tinplate industry. It appears that our able Chicago contemporary is touched at our allusion to the fact that at the recent Tinplate Convention in Pittsburgh letters were read from 500 tinplate consumers favoring the home manufacture of tinplate to guard against foreign imposition. Adverting to this fact, the TRADE REVIEW innocently asked if this meant that the *Artisan's* tin-importing and tin-consuming constituency was "going back on" it. In reply we have a beautiful essay on "cheap" tinplate, under the specious head of "Taxation as a Remedy for Worthlessness in Quality." The burden of our esteemed contemporary's complaint may be compressed into this syllogism:

Major premise—"Cheap John" sells cheap tinware, cheap cutlery, cheap clothing, etc., because there is a demand for it.

Minor premise—"Cheap John" would buy of American manufacturers if they were enabled by the tariff to go into the business of tinplate manufacture.

Conclusion—*Ergo*, all effects of American capital and skilled workmanship to supply America with American tinplate should be stifled.

Happily we do not have to look far for a reply to this (excuse us) absurd course of reasoning. In the very issue of the *Artisan* in which the editorial in question appears we find a communication from one of its readers in which, among other strong points in favor of the fostering of the tinplate industry, he makes the following—peculiarly apposite to the case in hand:

> Impose a tariff on tinplate that will place the American manufacturer on an equal footing with the British manufacturer and within less than seven years we would not only make our own tinplate and furnish a better article than we now import, but better suited to our commerce and our domestic uses. For generations we were dependent on Europeans for all our steel goods. A few American manufacturers of steel made little progress so long as only a small ad valorem duty was imposed; but so soon as a high specific tariff—free from all ambiguity—became the law of the land, not only did great steel works spring into existence, but the price of steel was reduced to less than one half we had been compelled to pay our British cousins! In 1864 American railroad managers paid $112 in gold, per ton, for English bessemer steel rails. In 1867 American steel rail mills began to receive orders; thus the British rails were furnished for about $75; in 1870 for $55. In 1877 American steel mills furnished superior steel rails at $40 per ton in currency! And now, notwithstanding the great demand for steel rails, the best in the market can be obtained at $45 a ton. This is a mere epitome of the history of all our manufactures which have commanded the attention of enlightened statesmen. The writer can remember when "India cotton"—a fabric not equal to our common "factory cotton"—retailed at 25 cents per yard. Now we get better goods at 6 cents. To a protective tariff are we indebted to this reduction and the superior quality of our goods.

Does that look like encouraging the building up of an American industry in worthless goods by means of a protective tariff? Does it not furnish a genuine example of "Taxation" (i. e., a Protective Duty) as an efficient "Remedy for Worthlessness in Quality"? If protective tariff has enabled America to manufacture better steel rails and cotton cloth more cheaply than England, why can it not, as the *Artisan's* intelligent correspondent argues, "place the American manufacturer on an equal footing with the British manufacturer and within less than seven years "enable us not only to make our own tinplate and furnish a better article than we now import, but better suited to our commerce and our domestic use"? We cannot but admire the liberality of the *Artisan* in admitting to its columns the numerous articles that have been sent it in opposition to its own views on the subject, and we assure it that it will yet live to see the day when the fallacy of its position will be demonstrated by solid facts which will admit of no gainsaying.

UTILIZING THE WORLD'S WASTE.

If this thing of utilizing the waste products of our manufactories continues, what may we not expect by the coming in of the Twentieth Century? It would be a mistake to suppose that the effort to capture the fugitive forces of nature is to be allowed to stop with the seizure of the ammoniac gases which now escape from the chimney's mouth. Already a very satisfactory and economical fuel is made out of the great heaps of culm heretofore aimlessly piled up at the mouths of coal-pits, and the experimenting has not fairly began. Again, we read of the interesting experiments of Mr. W. Mattieu Williams, F. S. A., in the direction of manufacturing building material from the slag of furnaces. So successful have they been that machines are now in operation in Great Britain that will turn out 10,000 to 12,000 slag bricks per day. These bricks have been utilized in various directions and are found to be more durable than ordinary stone. Out of this molten slag have also been cast slabs, paving blocks, glass bottles, and the fine slag wool, or silicate cotton, now in such large demand, and experimenting is now going on in the way of casting it in forms for ornamental purposes. Nor is this ingenuity confined to England. Even tunnel refuse is now being successfully used near Pittsburgh for the manufacture of brick. The borings that come from the tunnel are pulverized in a hopper, a stream of water at the same time pouring into it, until the mass is forced through a fine sieve and carried to a chamber where it is pressed into bricks which sell, it is said, $2.50 per thousand cheaper than the ordinary article. The arching of a tunnel with bricks made from the refuse is surely the acme of economy. What will we have next?

WHAT the mileage of new railroad for 1883 will be is just now the subject of interesting study. The *Railroad Gazette* has figures to show that the total mileage for the first half of the year is 1,966. Compared with 4,166 miles in the first half of 1882, this looks small, but statistics show that, 1882 aside, only one year (i. e., 1881) shows a larger mileage during the period named, and that only six miles more than this year. But again: It is invariably the fact that the total mileage laid during the last half of the year is much greater than that laid in the first half. Averaging the past 11 years, that of the last half of a year has exceeded that of the first half by 26 per cent., or over one-fourth. Taking the year 1881 as so far closely analogous to 1883, the *American Manufacturer* constructs a proportion which goes to show

that the total mileage for 1883 will be 7,562. This is considerably under last year (11,343) but is much better than the pessimists are wont to predict.

IN his intelligent address to the National Association of Stove Manufacturers, at Niagara Falls, June 27, President Whitehead brought out the fact that a decline of $2 per ton on pig metal amounted to about 29 cents on heating stoves, which average seven to the ton, and would only be from five to ten cents on smaller heaters, while on the other hand the price of mica has lately advanced so rapidly as to more than counterbalance this reduction. Nevertheless, the stove trade is in a reasonably comfortable condition. As in times of large profits in other lines of manufacture stove men were forced to be content with close margins, so in this period of dullness in other directions they are compensated by the fact that they are in no danger of over-production and consequent heavy loss.

PROFESSOR EDISON has much hope for the electric motor. To a Chicago interviewer he remarked that it had reached a point where it could be utilized on street railways, elevated railroads, and suburban roads," but," he added, "it will require many years before prejudice can be sufficiently overcome to permit of its adoption on large roads." Nevertheless, Mr. Edison had no doubt that its utility as a substitute for steam would be recognized before long—indeed, he is now building a 42-ton locomotive, with six-foot drivers, to be used on the underground railroad in London. He suggests that an arrangement can be effected by having a third rail, by which means the motor can gradually be introduced upon a large road and not interfere with the steam trains.

WITH pleasure we present in this issue the very interesting and practical paper read before the Civil Engineers' Club of Cleveland last Tuesday evening by Mr. Thomas D. West, foreman of the Cuyahoga Foundry and author of "American Foundry Practice." An understanding of the principles involved in securing clean castings for structural purposes is greatly assisted by the illustration accompanying the paper. At some future time Mr. West will, we understand, complete the discussion by treating of defects in metals, his present treatment simply covering defects in moulds. His second paper will therefore be looked forward to with interest by engineers, manufacturers, mechanics and others.

WE call attention to the publishers' notice on page 13, concerning "Monroe's Universal Assistant and Complete Mechanic." By special arrangement with them we are enabled to offer this valuable work as a premium for every new subscriber to the TRADE REVIEW AND WESTERN MACHINIST. Read in the announcement the scope of the work and forward the amount specified to this office, and you will promptly receive both the book and the paper. No intelligent mechanic can afford to be without either.

UNSOLICITED commendations is due the "Kankakee Line" (Cincinnati, Indianapolis & Chicago) for its many advantages over competing roads between Chicago, Indianapolis and Cincinnati, among which may be mentioned that it is the only line that runs parlor, sleeping, hotel and reclining chair cars between the points named; that runs through cars to Louisville, and that enters Chicago by the lake front. The line is all steel rail from Chicago to Cincinnati.

ADVERTISING in the TRADE REVIEW pays.

DEFECTS IN STRUCTURAL CASTING.

[Continued from Page 5.]

dry, Portland, Me. In the testing of these castings two rails were placed parallel, and after being leveled, the castings were raised one at a time and set upon them. The inspectors would then rotate them about one-half their circumference and after coming to a stand they would then be allowed to find their own gravity. By this process any unevenness of thickness was quickly detected, and if any of the castings in revolving to their gravity went faster than the allowed speed, they were condemned. To the best of my memory, the castings were made in green sand and cast horizontally. Now the question in my mind is, was not the test somewhat in error? In the horizontal casting of any cylindrical-shaped mould the cope or top part of the casting cannot be as sound as the sides or bottom, for the reason that it contains more dirt than any other portion of the casting. I think it is a safe assertion to make, that if a horizontal cast pipe or column that was found to stay in equilibrium at any point when being tested upon rails, was given an even internal tension, or end compression strain, until it would burst or rupture, the point of first fracture would be the cope part of the casting. I would like to hear of such tests being made, for I do think it would result in opening the minds of many to an important factor in the casting of structural work, which is as follows: where it is reasonable to expect dirt *make that section thicker or heavier than the proportion calls for in order to counterbalance the weakening effect caused through the mingling of dirt and impurities with the iron.*

As regards the question of how much thicker the top cope section of pipes or columns, as shown at H, should be over the sides and bottom, it would be rather difficult to answer, as it would greatly depend upon the combination of lengths, diameter and thickness, and also facilities for moulding. However, I would say that with a 12 inch column or pipe of average thickness and length, one quarter of its thickness, added to the cope as represented at H, would then not always be a guaranty of its holding its own in a testing machine.

In structural castings the question of proper proportions, shrinkage of metal and its quality contains three very important elements that require careful consideration, but as my limited time will not allow me to do full justice to the discussion of them, I will close with the remark: that to figure for strength in castings is one thing and to know if you have obtained it is another. The former is the work of rules and tables, the latter is only assisted through observation, investigation and practical experience.

At the close of reading a very instructive and interesting discussion was held, Messrs. Holloway, Walker, Gobeille, Bowler, Getchell and others taking part. Mr. Getchell stated that the castings, which Mr. West was not sure of being columns or pipes, he could positively say were pipes, as he well remembered the case, being there at the time, and also that he remembered them as being cast horizontally, and that about one third of the pipes were condemned.

THE St. Louis papers chronicle an important change in the Age of Steel, of that city. Mr. C. K. Reifsnider, the indefatigable business manager, has sold his one-half interest to his partner, Mr. Merrill Watson, who buys for himself and a few of his friends, Mr. Watson assuming the principal management. for which his extended experience and deserved popularity eminently fit him. Mr. Burns, who, we are assured, is a very capable gentleman, assumes the editorial chair, and Mr. Frank Reifsnider continues to represent the paper on the road—a very strong support indeed. C. K. Reifsnider still retains control of the Midland Farmer and intends to run it in connection with an experimental farm which he is about to purchase, thus giving him the rest and out-door exercise to which his years of activity justly entitle him Our best wishes go with all these gentlemen in their respective enterprises.

COMMUNICATIONS from practical men are always welcome, and will be promptly printed.

Practical Mechanics.

Beton in Combination with Iron as a Building Material.

BY W. E. WARD, PORT CHESTER, N. Y.*

If society is indebted to the restless spirit of progress for most of its modern comforts and conveniences, it certainly is not yet a debtor for any methods which successfully guarantee immunity against calamities from fire. While other departments of industry have received the benefits of improvement, the continuous and persistent use of combustible material for exposed portions of buildings has limited the intrinsic elements of the art of building construction, and confined improvements only to matters of design.

Incombustible materials are easily obtained, and much better adapted to the purpose for every apparent reason. Doubtless the question of increased cost, both in money and in time required for more thorough construction, may be in a measure responsible for the tardiness in adopting safer methods, and, in addition to greater expenditure, they may have been a want of confidence in the fire-proof methods which have been offered to the public for adoption. The importance of this question induced the writer, in 1871 and 1872, to make some experiments in a new and special direction, for the purpose of ascertaining whether a practically fire proof building could be designed and constructed, at a comparatively moderate cost.

The incident which led the writer to the invention of iron with beton occurred in England in 1867, when his attention was called to the difficulties of some laborers on a quay, trying to remove cement from their tools. The adhesion of the cement to the iron was so firm that the cleavage generally appeared in the cement rather than between the cement and the iron.

The line of experiments which followed were confined exclusively to working up the reciprocal value of beton, in combination with iron, in the construction of beams which were designed for supporting floors and roofs made of the same material. In this particular, the facts were conclusively developed beyond question, that the utility of both iron and beton could be greatly increased for building purposes, through a properly adjusted combination of their special physical qualities, and very much greater efficiency be reached through their combination than could possibly be realized by the exclusive use of either material, separately, in the same or in equal quantity.

Experience had long ago proved that unprotected iron, associated with combustible materials, is altogether unreliable for building purposes when exposed to a severe fire test; but it has been demonstrated, that, if iron is well protected by a heavy clothing of beton, its integrity can be safely depended upon under almost any emergency.

When all doubts were removed concerning the reliability of the several combinations of materials required in the construction, a building, embracing the following radical, new features, was erected, for dwelling purposes, near Port Chester. N. Y. Not only the external and internal walls, cornices and towers of the building were constructed of beton, but all of the beams, floors and roofs were exclusively made of beton, re-enforced with light iron beams and rods.

Furthermore, all the closets, stairs, balconies and portices, with their supporting columns, were moulded from the same material, the only wood in the whole structure being window-sashes and doors, with their frames, mopboards and the stair-rails; thus excluding everything of a combustible nature from the main construction.

Beton can be used in any form of construction, and is able to serve the requirements of any architectural or decorative effects. All the exterior portions of this house, which are more or less ornamental in their functions, were made of beton in place during the progress of the work. In the interior of the house, the cor-

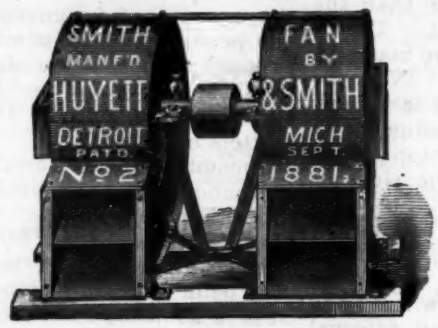
[Continued on Page 12.]

* Read before the American Society of Mechanical Engineers, at Cleveland.

The Smith Exhaust Fan.

The numerous cuts of the Smith Exhaust Fan, presented herewith and on the opposite page, clearly show the form as well as principle of this deservedly popular machine. Two illustrations are also given of the Forge or Pressure Blower and Wheel, together with views of the "Special Exhauster" for removing dust from Emery wheels, grindstones, etc. Among the claims made for this fan are the following:

1st. It takes only half the power to operate it than any other make of fan, of the same capacity, requires.



FRONT VIEW SMITH'S EXHAUST FAN.

2d. It has the direct suction inlet, requiring no elbows to connect the fan with main suction pipe, thereby maintaining a strong and unobstructed suction.

3d. It has two fans (or one single if seen fit to so construct it), propelled by one pulley and shaft, each fan separate and distinct from the other, may be piped to the exhaust room in one or two pipes, as desired—one may be used to pipe shavings, the other to sawdust, or one to conduct shavings and sawdust, and the other to conduct hot air to dry-kilns, or blow forges, furnaces, or for any other purpose where a strong and voluminous current of air is required.

4th. The blast wheel is one-third less in width and diameter than any other fan of the same capacity.

For instance: A fan of 200 inches inlet and 234 inches discharge, capable of discharging 4,000 cubic feet of air per minute, has a blast wheel 15¼ inches in diameter and 8 inches wide, with steel shaft 30 inches in length. Other sizes of fan in like proportion.

5th. It drives with one belt and pulley from centre of shaft (when made double), with best babbit lined boxes close on either side of pulley, thereby giving strength and solidity to its running parts, and avoiding the spring and vibration so common in other fans with long shafts and overhanging pulleys.

6th. It can be taken apart, both wheels, shaft and pulley removed from the case in five minutes, by any one who knows how to use a wrench.

7th. It is less liable to get out of order than the old style of fans, it being impossible (on account of the location of suction inlet between cut-off points) to wedge or block the fan with knots or blocks, as is often the case with other fans, oftentimes wrecking the entire fan. The Huyett & Smith Manufacturing Co., Detroit, Mich., are the patentees and sole manufacturers, and the numerous testimonials which they publish show that they are making rapid headway in introducing their specialty.

Origin of the Air Brake.

Mr. Jacob Reese, one of the most prominent railroad men in Pennsylvania, says that when Westinghouse was "a comparatively young man he invented an appliance which was to be used where railroad crossings occur. From that he became acquainted with railroad men. Later he conceived the air-brake. He went to Ralph Bagley and offered to sell him a half interest for $800. I remember Bagley came to me and asked me what I thought of the project. I told him if he had the money to spare he could make no better investment. Bagley purchased a half interest, and soon a test of the brake was made. A number of Pennsylvania railroad officials accompanied the inventors over that line to the vicinity of Altoona. There a test was made on the mountain side, and it proved a success." The patent has made Mr. Westinghouse a millionaire, and been equally profitable to his partner, while it has saved millions upon millions of railroad property from destruction and hundreds of lives.

SPECIMEN copies of the TRADE REVIEW free.

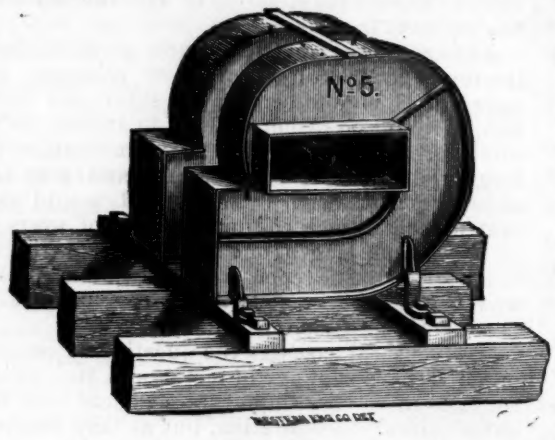
Recent Ohio Patents.

WM BRISBEN, engineer of the Lake Erie Iron Co.'s works, Cleveland, has been granted a patent on a lubricator that will increase and decrease the supply of oil according to the load the engine is pulling.

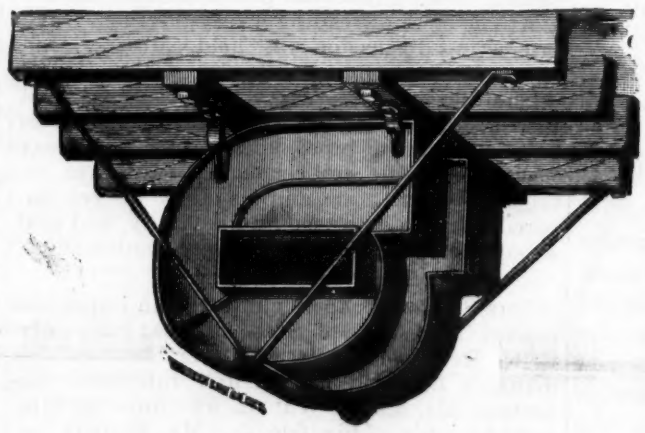
IN a can-opener invented by Jos. Rath, Columbus, the combination consists of the handle with an extensible rod; a cutter; a friction-roller placed back of the cutter; and a set-screw for holding the rod in position, the end of the rod being sharp pointed and provided with shoulders.

AN improved surgeon's operating chair, which is so constructed that the patient may be brought into any desired position, has been patented by Mr. F. Adon Krill, of Burton. This chair is of simple construction, and the position of the various parts may be readily changed to suit the requirements of the case.

AN improved apparatus for regulating the feed water supply of steam boilers, whereby the level of the water may be constantly maintained at the same point, has been patented by Mr. George C. Pyle, of Dayton, O. This contrivance is so constructed that when the water in the regulator reaches the level required, the float will automatically open the valve of the escape pipe, and the water instead of flowing from the pump into the regulator, will pass off by the escape valve, but if the water falls below the proper level the escape valve will be closed, and the water will flow into the regulator again until the water has acquired the desired level.



SIDE VIEW.

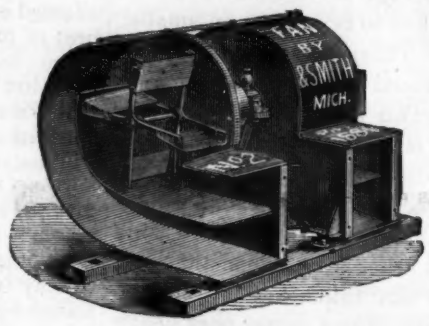

HANGING FROM CEILING.

MR. THEODORE P. CASE, of Powell, has obtained a patent for an improved vehicle tongue for sleds which is so constructed that it may be secured in a rigid position, or adapted to oscillate to either side, the object being to facilitate the loosening of the runners in case they have become frozen in the ground. This may be accomplished by securing the tongue rigidly to the sled, when a lateral pressure may be applied to the runners for their dislodgment. When this has been accomplished the tongue is rendered flexible, so that the sled may be controlled in going down hill.

THE NATIONAL FENCE.

A Sketch of the Barb Wire Industry.

The fact that steel wire for fence-making is one of the most important industries in the country and which if left untrammeled by any unjust royalties would grow to enormous proportions, gives interest, says the Chicago Journal of Commerce, to the struggle now going on in the courts to free the industry of barb wire making from the burdens of an unjust monopoly.



INSIDE VIEW.

The recent adverse decisions of the courts have recently brought together a number of barb wire men at Chicago, to compromise and otherwise arrange for less law and more wire, and the result is a reduction of more than one-half in the royalty and which is also deducted from the retail price of wire. A brief statement of the facts of this barb wire controversy will be of interest.

Plain—that is, unbarbed—wire had been in quite general use for fencing throughout the West for several years before barbed wire began to be made in a small way under patents taken out as early as 1868 by Kelley, and in 1874 by Glidden, and others not so well known. Between 1860 and 1876 there were fully thirteen different patents granted to various parties on barbed wire fences. But the business was in its infancy. Few realized what it was to become in half a dozen years. One of these few was Mr. Washburn, of Worcester, Mass. He conceived the idea of buying up all the important patents and making a great monoply.

In February, 1876, Washburn & Moen obtained their subsequently famous "reissues" of the Kelley and Glidden patents. The reissuing was ingenious. In this new form the patents contained and claimed much more than the originals. Under these reissues the Worcester firm set up its so-called "broad claim." It held that the patents gave it control of the principle of a barbed wire fence, no matter by what device the wire had been prepared. Having secured the patents, having had them reissued with those new and sweeping claims, the next step was to secure a decision from the courts sustaining them. This point was not gained for several years. Meanwhile the business had grown enormously. Thriving wire factories had grown up everywhere in the Western States, competing with the largest Eastern establishments. The business was entirely free. Makers knew little about the patents, cared less, and were not interfered with. But Washburn & Moen were quietly at work. In November, 1880, they gained their famous case in the United States Circuit Court at Chicago, Judges Drummond and Blodgett deciding that the reissued patents were valid and in full force.

The barb-wire business was brought to a short halt by this decision. Every factory in the country was practically closed. Every man in the country making, selling, or using barb-wire was liable to suit for infringement, and manufacturers were liable to pay ruinous back royalties. In this state of affairs Mr. Washburn and his attorneys summoned the principal manufacturers of the country to meet them for a grand settlement. They came together in Chicago in February, 1881, three months after the decision. Washburn was then in a position to dictate terms, and each maker took the best he could get. About forty firms were licensed to continue the business. each being limited as to the annual tonnage of its output and each being assessed a certain sum, larger or smaller, for back damages. Mr. Washburn and his licensees at this same meeting fixed upon a certain price for wire, no licensee being allowed to undersell. The price of wire to consumers was advanced by the monopoly about $40 above the recent current price (raising the wholesale price from about six

cents to about eight cents per pound). Washburn & Moen's royalty was $15 per ton. Small makers were not licensed, and were all crushed out.

Such then was the little monopoly which from February, 1881, to the present time has added somewhat more than $10,000,000 extra profit to the price of wire sold farmers in half a dozen Western and Northwestern States. Iowa being much the largest consumer, felt the burden heaviest. The farmers of that State formed a "protective association." They set up an establishment in Des Moines for making "moonshine" wire, and prepared themselves to fight the matter through the courts.

Meanwhile the Supreme Court of the United States had indirectly struck a blow at the monopoly by its decision on the subject of re-issued patents in the celebrated case of "Miller vs the Brass Company." In this case a new and valuable doctrine was laid down. There had arisen among a certain class of Eastern capitalists a very corrupt and pernicious practice in this matter of patents. If this article or commodity began to come prominently into the markets, they had a practice of rummaging among the old and abandoned patents until they found something in some wise relating to the now popular commodity. Of course this old patent could be bought up for a song. They would then have it "reissued" and so broadened and strengthened as to make it valuable and to give them a monopolizing power over the commodity. It was to check this dangerous practice that the Supreme Court laid down in the case of "Miller vs. the Brass Company" a set of new and stringent rules governing the reissue of patents.

The new doctrine threw a cloud over the Glidden and Kelly barbed-wire patents and the Chicago Drummond-Blodgett decision. It gave the Iowa farmers their basis for a case. Under the countenance of the Farmers' Association, several other "moonshining" factories rose and grew like mushrooms into large business by their ability to undersell the monopolists. Washburn & Moen entered suits and petitions against all these moonshiners. But the United States Courts in Iowa and Missouri showed from the first a lack of eager interest in Mr. Washburn's welfare and an entire unwillingness to grant preliminary injunctions closing unlicensed establishments.

Instead of carrying the suit against the farmers through the courts, the monopolists took a more characteristic plan. They bought up the Des Moines manufacturer, who was the agent for the farmers' association. The brunt of the fight on the "broad claim" was borne by a plucky firm of "moonshiners" at Grinnell, Ia., known as the Grinnell Wire Company, and their able young attorney, Mr. A. B. Cummins, of Des Moines. They deserve personal mention, for their victory has been the victory of the agricultural interests of the whole west—a victory which will save millions every year. This decision was made by the United States Judges McCrary, Love and Treat in the Circuit Court for the Southern District of Iowa, last month. It declares that Kelley and Glidden reissued patents invalid, and forever disposes of the "broad claim" to the principle of a wire fence.

SMITH'S SPECIAL EXHAUSTER.

SMITH'S SINGLE WHEEL FAN

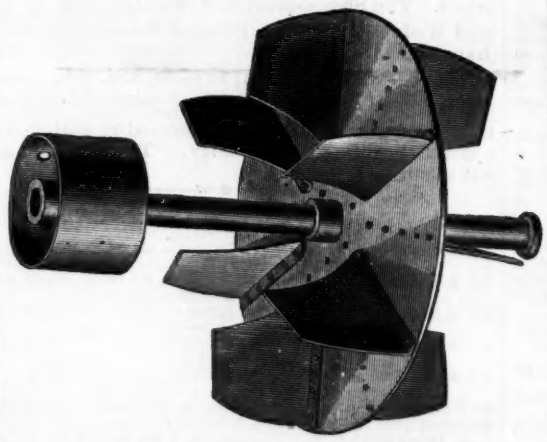
Washburn & Moen still claim patents broadly covering all the machinery by which wire is barbed. The Grinnell Company seem likely to also to have "the broad claim" on the machines: but there cannot be any decisions in the machine cases for more than a year. Meanwhile the other decision practically ruins the monopoly, for now no retail dealer who sells, or farmer who uses "moonshine" wire can be intimidated by Mr. Washburn's agents. The wire itself, once made and on the market, is free, no matter whose machinery barbed it.

These events have multiplied the establishments outside the pale of the monopoly, and have made those inside terribly uneasy. And they sufficiently explain the meeting in Chicago.

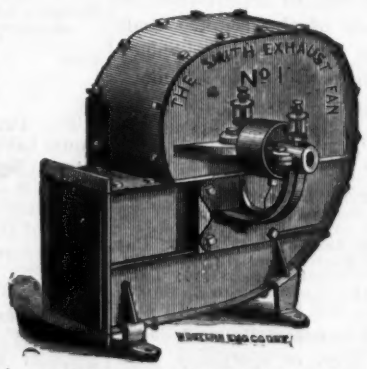
It is to be hoped that an equitable understanding will be arrived at giving all manufacturers equal rights and arranging for a uniform price that the steel wire makers may be able to furnish the raw materials, the barb twisters be able to increase their business and the farmers be sure of a cheap and durable fence.

The barb wire makers in convention at Chicago adjourned on Friday. The differences between the Massachusetts firm and other establishments have been temporarily adjusted by a compromise. A proposition was submitted to Mr. Washburn to reduce the royalty from three-fourths to three-tenths of a cent per pound, and he signed the agreement. One of the manufacturers said, however, that the suits would continue, because the licenses still maintained that the attempted monopoly was without justification.

SMITH'S FORGE BLOWER.


INSIDE OF SMITH'S FORGE BLOWER.

SMITH'S SPECIAL EXHAUSTER.



SMITH'S SINGLE WHEEL FAN.

Begging the Question.

One of the most significant things about the recent tinplate convention was this, incidentally mentioned by the American Manufacturer:—"Letters were read from 500 tinplate consumers favoring the home manufacture of tinplate, to guard against foreign imposition." How is this? Is the American Artisan's tinplate constituency "going back on" it?—CLEVELAND TRADE REVIEW.

If 5,000 instead of 500 consumers of tinplate had sent their little billet doux, it would have been but as a drop in the bucket. This we know, that we can go into places in Chicago where "cheap" tinware is sold, and buy a jackknife for a dime, a pair of scissors for a five-cent piece, and a hundred other things not worth carrying home, the manufacture of every one of which has been protected by a heavy tariff. We can go to another store and buy clothing which is too utterly "cheap" for any decent use. Yet cloths and clothing are sufficiently protected by the tariff. So with boots and shoes and other line of trade. Worthless tinplate finds a market because there are concerns which want it and buy it because it is cheap. It is simple nonsense to suppose that a demand for this kind of stuff would not be met by American manufacturers in the event of the establishment of this industry in this country, just as the demand for cheap and worthless cutlery, clothing, etc., is met by a home supply despite a high protective tariff. It would be an entirely natural thing that initial experiments in the making of tinplates should result in the production of not a few lots of poor plates. And not many who have money involved would be likely to throw them away when there were buyers at hand ready to return them at least a portion of the cost of production. The American Artisan would be pleased to see the use of worthless tinplates entirely done away with. Their importation or production might be prohibited by law, the government taking the matter in hand as it has that of the importation of adulterated teas. But that the production of tinplates in this country, if accomplished, would secure this desirable result, we have not the slighest confidence. If the agitation for a high tax upon imports of tinplates has no better basis to build upon than this specious plea, it cannot succeed.—[American Artisan.

The Manufacturing Prospect.

The Iron Age in discussing the cost and probable workings of the new tariff, says: "It is generally expected that the first week in July will mark the beginning of an improvement in business. We certainly hope this will prove true, and there are already many indications of a better feeling. The iron market, after a depression which cannot be explained on any other ground than a loss of public confidence in the future development of our domestic industries, shows signs of a revival, which is equally difficult of explanation, unless we attribute it to the fact that these industries find themselves less seriously hurt than they feared. So far as the changes is the rates of duty are concerned, they cannot at present affect the market, although in future they will operate to keep the level of prices somewhat lower than the average of past years. The metal trades are also exempt from any present embarrassment from this cause. It is scarcely proble that the consumption of tin plates will be increased by the reduction of duties, as all that the country needs have come in under the old rates. Whether importers or consumers will get the benefit of the reduction remains to be seen. Our copper surplus for export is somewhat too large to leave room for importations, and the other metals are not likely to be presently affected. Before the end of the year we shall have opportunity of noting the practical effect of the changes, and of observing how the Treasury Department officers will construe those portions of the law which are more or less ambiguous."

THE principal bridge on the line of the new Harrisburg & Western Railroad will be the one at Harrisburg, crossing the Susquehanna. The bridge will cost $500,000. It will be an iron truss of the latest improved pattern, and the contract for its construction will be let in the fall. Ten great tunnels will be constructed, varying in length from 1,800 to 6,300 feet. It is estimated that it will cost $20,000,000 for a two-track road from Harrisburg to the junction with the Pittsburgh, McKeesport & Younghiogheny, or $100,000 per mile. The Pittsburgh, McKeesport & Younghiogheny furnish the terminal facilities at Pittsburgh.

Market Review.

OFFICE OF TRADE REVIEW AND WESTERN MACHINIST.
CLEVELAND, FRIDAY EVENING, July 13, 1883.

IRON ORE.

July being a dull month any way, dealers in iron ore have not been looking for much of a trade and so are not disappointed that orders, though somewhat active, are only for small lots. The receipts of the past week show a considerable increase over last week, being 37,933 tons, an increase of 23,038 tons over our last report. Shipments, however, have shown a decrease—12,088 tons this week to 13,041 tons last. Lake freights remain substantially unchanged. We hear of some sales for future delivery but at prices somewhat shaded from the following :

No. 1 Specular and magnetic Bessemer Ores per ton	$7.50@ 8.00
No. 1 Specular (non-Bessemer) ores per ton	6.50@ 7.00
Bessemer Hematites	5.00@ 5.25
Non-Bessemer Hematites	4.25@ 4.75
Menominee Range Bessemer	6.25@ 6.75
Menominee Range non-Bessemer	4.50@ 5.00

IRON.

PIG IRON.—To describe the increasing inquiry noted last week as a "new movement" would seem, in view of all the facts, somewhat premature. While it is true that there are more buyers than three weeks ago, there has been no improvement in prices and any attempt to stiffen them is met by a prompt declination to place orders. Sales of even 500-ton lots are made occasionally in the regular line of business, some for future delivery at the rate of 100 tons per month, and we hear of one sale of charcoal iron for delivery in December, but no particular significance is attached to this, by the more conservative dealers, as indicating any encouraging revival of trade as yet. Of course, the market will be no better until there is an improvement in prices, no matter what individual sales may be made; yet the more sanguine are prone to seize upon and discuss with eagerness every "pointer" to more activity, and in this sense the surface indications are, to say the least, not entirely disheartening for a healthful reaction in the not distant future. The Eastern market continues to slightly improve. We quote without change for Cleveland :

CHARCOAL PIG IRON.

No. 1 Lake Superior charcoal	$24.00@26.00
No. 2 Lake Superior charcoal	25.00@26.00
Nos. 3 and 4 Lake Superior	26.00@27.00
Nos. 5 and 6 Lake Superior	25.00@27.00
Nos. 1, 2, 3, 4, 5, Salisbury	35.00@37.00
Southern Car Wheel	28.00@33.00

BITUMINOUS AND COKE IRON.

No. 1 foundry, all lake ores	$21.00@22.00
No. 2 same	20.00@21.00
No. 1 foundry, lake ores, with cinder mixture	20.00@21.00
No. 2 same	19.50@21.00
No. 1 foundry, native Ohio ores	19.50@22.50
No. 2 same	20.00@21.00
No. 1 silvery, native Ohio ores	20.00@22.00
No. 2 same	18.00@19.50
No. 1 gray forge, red short	19.00@20.00
No 1 gray forge, neutral	18.50@19.00
No. 1 Bessemer	22.50@23.00

CINCINNATI.

[Reported for the TRADE REVIEW by E. L. Harper & Co.]

The market continues fairly active and inquiries are numerous. Many of the furnaces, discouraged in their hopes for an improvement, have sold liberally of late, and some large lots have been taken out of the market. Production seems to be still in excess of present demand, though not largely. There is no new element apparent, and the indications favor a continuance of the present condition of things until an improvement in the general commercial interests of the country shall justify a healthy demand which will warrant an advance in prices the reflex result of which will be, to stimulate every industry wherein crude iron is a factor, and it is a fact known to all that the prosperity of the iron interests means general prosperity. We quote (four months):

Foundry—Hanging Rock Charcoal, No. 1, $23 75@$24 75; Hanging Rock Charcoal, No. 2, $22 75@$23 25; Strong Neutral Coke, No. 1, $20 00@$21 00; Strong Neutral Coke, No. 2, $19 00@$19 50; American Scotch, No. 1, $18 50@$19 50 Grey Forge—Neutral Coke, $17 50@$18 00; Cold Short, $16 50@$17 00. Car Wheel and Malleable—Hanging Rock Strictly Cold Blast, $28 00@$28 75; Hanging Rock Warm Blast, $24 00@$24 50; Lake Superior, 1 and 2, $24 00@$25 00; Lake Superior, 3 to 6, $25 00@$26 00; Southern Car Wheel Strictly Cold Blast, $28 00@$29 00.

[Reported for the TRADE REVIEW by Rogers, Brown & Co.]

The pig iron market in the West in sympathy with that in the East is improving. We can not yet record a decided advance in values but the improvement in demand is so general as to encourage holders to look for better prices soon. Some transactions of considerable size were closed during the week, and others are pending. The stocks that had accumulated in the South during the term of combination prices have almost entirely disappeared, and the books of most furnaces are well filled with forward orders. Stocks North of the Ohio are also light and diminishing. There is an undercurrent of better feeling and a prospect for a good Summer's business at prices certainly no lower than at present. We quote for cash :

Hot Blast Foundry.—Hanging Rock Charcoal, No. 1, $23 50@$25 00; Hanging Rock Charcoal, No. 2, $22 00@$24 00; Southern Charcoal, No. 1, $22 00@$23 00; Strong Coke, No. 1, $21 00@$22 00; Strong Coke, No. 2, $19 00@$20 00; Strong Coke, No. 3, $18 50@$19 50; Soft Stone Coal, No. 1, $20 50@$21 00; Soft Stone Coal, No. 2, $19 00@$20 00. Forge—Strong Neutral No. 1 mill, $18 00@$19 00; Cold short No. 1 mill, $17 50@$19 00. Car Wheel & Malleable—Hanging Rock Cold Blast, $31 00@$33 00; Hanging Rock Warm Blast, $25 00@$27 00; Southern Car Wheel Iron, $27 00@$28 00; Lake Superior Car Wheel Iron, $25 00@$26 00: Lake Superior Malleable Iron, $25 00@$26 00.

CHICAGO.

[Reported for the TRADE REVIEW by A. B. Meeker & Co.]

There is a continued fair demand, but no change in prices. We quote today (July 10) :

Lake Superior Charcoal, 1 & 2, $24 00@$25 00; Lake Superior for Car Wheels, No. 3, $24 00@$25 00; Lake Superior for Car Wheels, 4 and 5, $25 00@$26 00; Scotch, according to brand, No. 1, $26 00@$27 00; Hanging Rock, Charcoal, No. 1, $24 00@$26 00; Hanging Rock Coke, No. 1, $23 00@$25 00; Anthracite, No. 1, $23 00@$25 00; Anthracite, No. 2, $22 00@$24 00; American Scotch, No. 1, $23 00@$26 00.

OILS.

The market is easy, with no great demand and a sufficient supply.

COAL.

Business has been rather slow the past week, as local coal dealers are not soliciting orders very much yet. We quote an advance in the wholesale price of anthracite, and learn that there will very likely be an advance in the retail market by the 15th. In the East, the Coal Trade Journal says that there is a very fair trade in anthracite, in anticipation of the July advance. The Journal states that to the end of June this year there were 13,869,433 tons of anthracite produced, as against 12,567,851 tons last year, an increase of 1,301,582 tons. There is nothing special to note in the bituminous coal market, most of the mines running steadily. Lake freights to Milwaukee are 60 cents ; Sheboygan, 85 cents.

MANUFACTURED IRON.—There is no especial improvement to note, but prices are perhaps a trifle stiffer at $2 per cwt.

WROUGHT PIPE.—Trade is quiet and without change.

STEEL RAILS.—Orders for small lots are the rule. The sale of 5,000 tons at $42, July delivery, is reported.

SCRAP.—Trade is lifeless, but dealers are still talking of an early improvement.

HARDWARE.

Trade is without special change ; prices remain about the same. The File-makers' Association of the United States met at New York recently and decided to advance prices. The Shovel-makers' Association met in Cleveland Wednesday, but the result of the meeting has not transpired.

NAILS.—We quote nails at $3.00 and firm. At the regular meeting of the Western Nail Association at Pittsburgh Wednesday it was resolved to shut down for a month, begining next Monday. The card rate, $3.25, was reaffirmed.

LUMBER MARKET.

PLANK—MIXED WIDTHS, 1¼ AND 1½ INCH.

A 1 & 2..$50 00 A 3..$40 00 B..$32 00 C..$21 00 D..$14 00 E..12 00

2-IN. 12, 14 AND 16 ft., TOGETHER.

A 1 & 2..$48 00 A 3..$40 00 B..$32 00 C..$21 00 D..$14 00 E..13 00

BOARDS—1 IN. MIXED WIDTHS.

A 1 & 2..$45 00 A 3..$36 00 B..$30 00 C..$20 00 D..$15 00 E..12 00

STOCK BOARDS—12 IN.

A 1 & 2..$45 00 A 3..$36 00 B..$35 00 C..$20 00 D..$15 00 E..12 00

STRIPS—6 IN.

A 1 & 2..$42 00 A 3..$... B..$35 00 C..$22 00 D..$17 00 E..12 00

FLOORING, SIDING AND CEILING.

Matched flooring .....A 3, $42 00 B, $38 00 C, $24 00 D,20 00
Matched drop siding, 6 in.A 3, $42 00 B, $38 00 C, $24 00 D, 18 00
½ in. bevel siding.....A 1 & 2, $24 00 A 3, $20 00 B, 18 00
Beaded ceiling $2 higher than flooring.

BILLSTUFF.

Small joist, 12, 14 & 16 ft $13 00 | Small timb'r, 12,14,16,18 ft 14 00
18 ft .....$13 00@$14 00 | larger than 8x8, special.
Long timber, 20 ft. and over, add about $1 per ft. to the price of short.

SHINGLES, LATH AND MILL WORK.

Shingles, XXX, 18 in.....$4 25 | S, 1 S, $1.00; S, 2 S $1 50
clears or clear butts..
$2 50@$3 00 | Matching, flooring and
Lath .....$2 75 | drop siding.....$2 00@$2 50

Excursions to the Northwest.

The Pennsylvania Company and the Pan Handle Route have issued a neat pamphlet giving the excursion rates to the prominent health and pleasure resorts of the West and Northwest from the principal points along their lines. A copy can be obtained by addressing any agent of the cumpanies, or E. A. Ford, General Passenger Agent, Pittsburgh.

BUILDING and machinery contractors will be interested in the following recent fires: At Elgin, Ill, Henry Geister's mowing machine works, loss $25,000, insurance $10,000; at Clyde, O., Hunter & Wilcox's mill, elevator and machine shop, loss $50,000, insurance $28,500; at Massillon, O., Massillon Paper Co.'s mill, loss, $25,000, insurance $10,000 (works will be immediately rebuilt); at Reid City, Mich., E. L. Mort's tannery, insured; at Grand Ledge, Mich., West Bros.' furniture factory.

F. W. JANSEN & SON, 276 and 278 Wabash avenue, Chicago (F. J. Barnes, manager), are among the leading manufacturers of office, parlor and bedroom furniture of the Northwest. Their extensive factory is well worth a visit. Their office furniture is of the most approved construction.

Contracts and Construction.

[Under this head the TRADE REVIEW proposes to summarize various large contracts to be let within easy range of Cleveland, to the end that its advertisers, both at home and abroad, may be informed and be thus enabled to put in bids for different parts of the work in which they may be interested. If purchasing agents of railroads and of other large corporations will forward their invitations for proposals, the REVIEW will put them in shape and publish the same gratuitously. Mention the TRADE REVIEW in writing to parties for further information.]

THE contract for the Bellefontaine, O., water works was let for $53,580.

WATER-WORKS are being talked up at Lansing, Mich., and Eau Claire, Wis.

JUNE 24 the corner-stone of a $30,000 addition to St. Joseph hospital, at Fort Wayne, Ind., was laid.

NEW hotels are projected at Horton, Mich., Cavalier, Dak., Grand Rapids, Mich., and La-Moure, Dak.

MR. W. W. BALDWIN, of Cleveland, is president of the new stove works to be started at Chattanooga, Tenn.

WORK on the foundation of the new building for the Rochester, Minn., seminary and normal school is in progress.

MR. J. A. BARNETT is to put up a fine business block 60x1000 on the corner of Main and Factory streets, Springfield, O.

NEW school-houses are to be contracted for at Wadsworth, O.; Garfield, Dak.; Concord, Mich.; Marrinette, Mich., and Wahpeton, Dak.

THERE is some talk among the Catholic fraternity of Peoria, Ill., of erecting a $250,000 cathedral some time time during the summer.

THE contract for the construction of a main sewer in Madison avenue Cleveland, was taken by L. V. Stanley, whose bid was about $25,000.

CONTRACTORS are invited to hand in proposals for the new works of the U. S. Rolling Stock Co., just out of Chicago, to cost something like $2,000,000.

CITY Civil Engineer Morse, of Cleveland, will on July 10 open bids for the construction of a main sewer in Water street, between Main and Superior streets.

AN Ohio capitalist wishes to start a rolling mill in Atlanta, Ga., and has been in correspondence with Mr. Nat Haven of that city in regard to the matter.

NEW opera-houses are in prospect for Grand Rapids, Mich., Flint, Mich., and Fargo, Dak., and the Grand Opera House at Milwaukee is being extensively remodeled.

THE Keokuk Plow Works have purchased twelve acres of ground and begun the work of erecting thops which will have a frontage of 450 feet when completed.

A company is about to organize at Mankato, Wis., with a capital of $75,000, for the purpose of manufacturing iron fence-posts for farm use, upon which they have a patent.

IT is rumored that several wealthy gentlemen of Chattanooga, Tenn., will go in with Mr. Hayden, of Ohio, and organize a stock company for the erection of a pottery, with $30,000 capital.

THE Griffin Car Wheel Co., of Detroit, Mich., owing to increasing business, has established branch shops at Buffalo, N. Y., with a capacity of 250 car wheels and 30 tons of casting per day.

AT the meeting of the German Lutheran synod at New Ulm, Minn., a resolution was adopted to build at the earliest time possible an institution combining a preparatory school for divinity students and an academy or high school, so-called, the building to cost about $14,000.

RECENT Ohio incorporations, with capital stock: Ohio Encaustic Filing Co., Zanesville, $50,000; Troy Grape Sugar Co., Troy, $10,000; Ohio Hub and Stave Co., Paulding, $10,000; Collins Manufacturing Co., Collins, Huron County, $20,000; U. S. Fire-Proof Lumber Co., Cincinnati, $500,000; Willow Bank Railroad Co., $5,000; Bucyrus Water Co., $80,000; Muskingum Valley Construction Co., Marietta, $25,000.

Cleveland Wholesale Prices.

[The lowest quotable prices are given in all cases.]

HARDWARE.

Adzes.

Carpenter's.....per doz	$18 40
Ship..... " "	18 75
Heavy railroad.. " "	19 50

Axes.

	per doz.
James' 2d qual.....	$7 00
Buckeye.....	7 75
" doub. bitt.....	15 00
Hunt's.....	9 50
Mami's.....	8 00
Lippincott's Crown.....	8 50
Cut More.....	9 00
Peck's Double Bit.....	22 00
"Champion Blade.....	11 00
Good triple silver steel..	11 50

Axles.

Standard list,....
Nos. 1 to 6, 50 & 10 off
Nos. 7 to 14, 50 & 5 off
Nos. 15 to 18, 45 off
Nos. 19 to 22, 50 & 5 off

Anvils.

	per lb.
Eagle, Amer.....	10c dis 20
Wright's.....	11¼c@11c
Armitage's Mouse Hole.....	9¼c@9¾c
Trento.....	10¾c
Wilkinson's.....	10½c

Anvil Vise and Drill.

Millers Falls Co. $28.....dis 20
Cheney Anvil and Vise dis25&2

Augurs and Bits.

C S cut augers .....dis 50&10
do do do bits..... 50&10
D C gimlet do Ives.. dis 50
Snells bits .....dis 40&10
Russell Jennings' augers, dis 10&10&10
Cook's pat augur.....40&10

Animal Pokes.

Akron.....$ 3 50
Camp's..... 4 00
Berea, per doz..... 4 00
Eagle, per doz..... 5 00

Apple Parers.

Domestic & Reading ℔ doz. $7 00
Turn Table..... 4 50

Bolts.

Machine..... dis 70
Plow..... dis 50
Plow, R. B. & W..... dis 40
Cast Iron Barrel Shutter, etc .....dis 55&10
Cast Iron Chain (Sargent' list).....dis 60&10
Ives' Pat. Door Bolts. dis 50
Wrought Barrel.....dis 55&10
Wrought Square.....dis 55&10
Wr'g't Shut'r, all iron, Stanley's list.....dis 50&10
Fire. R. B. & W., new list .....dis 70&10
Stove, American Screw Co.'s ..... dis 40
B. B. & W ..... dis 10
Bolt Ends 16c. per lb. net. 60

Bellows.

	Dis
Bl'ksmith's com new list, 50 ℔ ct	
Moulder's new list, dis 25 ℔ ct	
Hand, new list, 25 per cent	

Butts.

	Dis
Wrought brass.....	70
Cast, loose joint....	60&10
Pin, loose	55&10
Wrought, fast joint narrow.....	50&10
Wrought fast joint broad.....	50&10
Wrought loose joint broad	55&10
Wrought table and back flaps.....	50&10
Loose joint, without acorns.....	55&10

Ten per ct. extra dis for cash.

Boiler Plates.

"Gaylord"-Standard Quality.
C. No. 1.....4 50
C. H. No. 1 Shell.....4 75
C. H. No. 1, 50,000.....5 25
C. H. No. 1, 55,000.....5 75
C. H. No. 1 Flange.....6 50
Firebox .....
T. S., 60,000 .....(as per)..6 50
T. S., 65,000 .....(act of)..
Homo. Steel, 70,000 (of Cong) 7 50
Heads, ¼c ℔ lb. extra.
N.B.-Eastern brands of boiler plate at from 2-10 to 3-10c ℔ lb less than above prices.

Boiler Tubes.

"National" Standard Gauge 1 inch to 10 inch.....dis 37½
"National" Standard Gauge 11 inch to 15 inch .... dis 25
"National" Special Locomotive Tubes .....net list

Bag Holders.

Sprengle's Pat, $18.00 per doz 40 per cent. dis.

Boiler Makers' Tools.

Doty's Power Shears ..net list
" Hand Lever Shears.net list
" Power Punch.....net list
" Hand Punch.....net list
Steel Screw Punch.....net list
Iron Screw Punch ....net list
Boiler Plate Rolls.....net list
Buffalo Forges & Blowers dis 20
Watson's " " net list
Spring Tube Expander ..dis 15
Roller Tube Expander.net list
National Tube Cleaner .dis 20
Wire Flue Brushes ....net list
Anvils—'Peter Wright' 12½ ℔ lb
Solid Box Vises net list

Cleveland Stamped Elbows

Genuine Russia Iron

4½ inch, per doz.....	5 50
5 do do	7 50
6 do do	9 50
7 do do	11 00

Charcoal Iron

4½ inch, per doz.....	2 50
5 do do	3 50
6 do do	4 25
7 do do	5 50

Planished Amer. Russia Iron

7½ inch per doz.....	5 00
4 do do	6 50
5 do do	9 50
6 do do	8 05

Discount 33⅓ per cent

Chisels.

Hot and cold cutting...℔ lb 30
Railroad track 30
Machinists..... 30
Mallet head 50
Tape 50
Packing 50
Stone cutters 50

Crowbars.

Cast steel ..... ℔ lb 7
Iron, steel points..... 5c

Cutlery, Pocket and Table.

Meriden Cutlery Co., table net
Am. Miller Bros.' Cutlery Co .....dis 25
Humason & Beckley, pocket 33⅓
Naugatuck Cutlery Co. list net
Aaron Berkenshaw's ..... pocket dis 25
Fram Cutlery Co., .. table net
Cleveland Cutlery Co...dis 25
Miller Bros., pocket.... 33⅓
Akron Cutlery Co.....dss 45

Coopers' Tools.

Bradley's ..... dis15@20
Braton's ..... dis15@20

Chains.

Coil by cask,.....

3-16	¼	5-16	⅜	7-16	½
10¼	9	8	7	6¼	6¼

Drills and Drill Stocks.

Blacksmiths', each $2.50 dis 10
Blacksmiths', self-feeding, each 7.50 dis 20
Breast, P. S. & W ...dis 20&10

Drawing Knives.

Peck, Stow & Wilcox... dis 70
Witherby's .....dis 65@10
Nobles Mfgr. Co 15
Adjustable handle 20

Emery and Sand Paper.

Regular Numbers .....℔ lb 6c
Flour and F. F. ..... ℔ lb 4c
B. & A. Emery Paper dis 30&5
Sand paper .....dis 30&5

Enameled & Tinned Ware.

Kettles .....dis 50
Sauce Pans .....dis 30
Tinned Sauce Pans..... dis 30

Files.

Parkin's $5 to £..dis 45 ℔ cent
E. M. Boynton's, new list dis 25
J. & Riley Carr .....4.50 to £.
Johnson & Bro. .....dis 50
Butcher's.....4.50 to £.
Walter Spencer & Co.'s
"Diamond"..... 4.50 to £.
Fisher's.....4.75 to £.
Moss & Gamble.....4.50 to £.
H. Disston & Sons (new list) ..... dis 45 per cent
Heller Bros.' Horse Rasps dis 35
Nicholson..... dis 45
New American..... dis 45
Union File Co..... dis 45

Grindstones.

Beroa.....1@1½ ℔ lb
Ohio.....1¼@1½ ℔ lb
Nova Scotia.....1¼@1¾ ℔ lb
Lake Huron.....1@1¼ ℔ lb

Hammers.

Maydole's .....dis 15
Cheney's .....dis 25
Hartford Hammer Co.....dis 20
Humason & Beckley.....dis 50
Verree.....dis 5
Magnetic Tack, Nos. 1, 2, 3, $1.25, $1.50 and $1.75, dis25&10
Nelson Tool Works..dis 40&10
Warner & Noble's .....dis 5
Kip's .....dis 15

Hatchets.

Buckeye.....Shingling,
Nos...1, 2, 3,
℔ doz $7 50, $8 00, $8 50, dis 40
Claw,
Nos...1, 2, 3,
℔ doz $8 25, $8 75, $9 25, dis 40
Lathing,
Nos.....1, 2, 3,
℔ doz $7 50, $8 00, $8 50, dis 40

Hinges.

Champion double acting spring hinges .....dis. 30
Screw & Strap 8@12 in. ..$5. net
Gravity Locking Blind Hinges, Sargeant & Co. 70&10
Clark & Co.....70&10

Locks.

Whipple Mfg Co ..... 50 & 5
Norwalk Lo Co .....45&10

Nails.

10 to 60d $3 00
8 and 9d 25
6 and 7d 50
4 and 5d 75
3d 1 50
2d 2 75
3d fine 3 00
2d fine 3 75
⅝ inch 3 00
4d barrel 1 00
1¼ inch barrel nails..... 1 50
1¼ do do do 1 75
1 do do do 2 50
⅞ do do do 3 00
Cut spikes, all sizes..... 35
Clinch nails, all sizes..... 1 75
Casing and box nails..... 75
Finishing nails,.....$1 25
Tobacco nails. 50

Nuts and Washers

Nuts, square ..... 8c off list.
Nuts, hexagon..... 9c. off list.
Washers..... 7c off list.

Nuts, Bolts, etc.

Machine Bolts .....dis 70
Bolt Ends .....dis 70
Boiler Patch Bolts.....net list

Picks.

Railroad, 4 to 5 lbs.. doz $6 60
5 to 6 lbs.. 7 20
to 7 lbs.. 7 80
7 to 8 lbs.. 8 40
Railroad Tamping Pick.. 7 to 8 lbs..doz 10 80
Mill Picks per lb..... 75c

Planes.

Ohio Tool Co .....dis 20
Sciota .....dis 25
Bailey's Pat. Adjstbledis 20@10
Sandusky, fancy .....dis 15
Buckeye .....dis 20
Ogontz .....dis 25

Rivets.

on .....dis 40
inned .....dis 40
opper .....dis 50

Rules.

Stanley..... ....dis. 70 &

Squares.

Steel or iron, case lots..... 50
Try squares and T bevels....40

Spikes—WROUGHT

All lengths by ¼ inch 4½c
do do do 5-16 ..... 3¾
do do do ¾, 7-16 & ½ in 3¼

Shovels and Spades.

Ames' new list, July 1, 1881, ...dis 15
Old Colony.....dis 15
Remington's (Lowman's Patent).....dis 30
Bishop .....dis 50
Chisholm.....dis 25@30
Rowland's .....dis 40 and 10
Griffiths ..... dis 40&10

Sad Irons.

From 4 to 10 lbs.. per lb 3 net
Self-Heating.....℔ doz $9 net
Tailors..℔ doz $18 net
Gleason's Shield and Toilet .....dis 25
Mrs. Pott's Irons, double pointed.....dis 35
Mrs. Pott's Irons, square back.....dis 35
Enterprise Star Irons....dis 35
Combined Fluter and Sad Iron.....℔ doz $15, dis 15

Saws.

Disston.....dis 20
Disston's Circular .....dis 40
Disston's hand panel, rip, &c .....dis 20
Boynton's lightning cross cut new list .....dis 40
Boynton's circular and mill.....dis 40
Boynton's ice.....dis 25
Boynton's lightning hand panel and rip .....dis 25
Livingston's butcher and kitchen.....dis 20
Livington's framed wood Nos. 101 102 103 104 105 doz $10 8.50 10 7.50 6.20 net
Peace circular & mill...dis 40
Peace hand panel and rip .....dis 25
Peace band saws, all widths.....dis 10

Scales.

Hatch, Counter, No. 171... ℔ doz. $42, dis 37½&10
Union Platform.....$6, dis 45
Fairbanks'..... dis 20
Buffalo Scale Co..... dis 40
Forsyth Scale Co.....dis 25
Howe's.....dis 20&10
Chatlilon's Eureka.....dis 25
Family Universal.....dis 50
Scale Beams.....dis 33⅓ &10

Screws.

	Dis
Flat head iron or steel [new list] per cent dis.	55
Flat head brass	55
Round head iron or steel	50
Round head brass.....	45
Brass and Silver capped.	30
Japanned, list of Plain Screws.....	40
Coach, patent Gimlet point, list per 100	65
Lag, taper points.....	20
Bed	10
Machine, flat head, iron. round head, iron	55&10
Bench, iron..... wood, beech, per doz $8	10
wood, hickory	20&10

Tinners' Tools & Machines

Machines (P. S. & W.) ... less 10
Tools (P. S. & W.) ..... " 20

Plumbers', Steam and Gas Fitters' Supplies.

Wrought Iron Pipe dis 70&10
Malleable Iron Fittings... list
Grey Iron Fittings ....dis 50
Steam Brass Goods.....dis 55
Water " " ..... dis 50
Ludlow Gate Valves ...dis. 20
Register Gauge Cocks net 1 00
Montg'ry Gauge Cocks $1 each
Steam Gauges.....dis. 40
Steam Guages 5 in. net dial per doz..... 30 00
Scotch Glass Tubes.....dis. 70
Tools..... special.
Duplex Injectors ..... net.
Soil Pipe & Fittings, Mott's List.....dis. 30
Sinks, Mott's List..... dis. 25
Copper Bath tubs, sinks, etc.....dis. 25
Galvanized Iron Boilers "Scaifes." .....dis. 50
Marble Slabs, Counter-sunk net per ft.....$ 1 25

Sheet and Tank Rivets.

"Norway."

All sizes.....dis. 15

Boiler Rivets—"Albany." ½, ⅝, 11-16, and ¾ in. diam. 5 00

Valves. Dis.

Jenkins' Patent Gate Valves.35
" " Globe " ..40
" Standard Packing " .20

Vises.

Solid Box, list of July 1, '79,.....dis 45
Solid "Crown" (A. H. Hildick)....40 to 100 lb, 15c net
Solid, Peter Wright's.....15⅓
Solid, Wilkinson's.....13⅓
Parallel, Parker's.....dis 10
" Simpson .....dis 20
" Prentiss.....dis 15
Saw Filers, Hopkins' ℔ doz $17.50, dis 10
" Wentworth's .. 9 00
Reading.....dis 45&10
Cowell Hand Vises.....dis 20
Richardson's Vise and Anvil.....dis 25

Wrenches.

Coe's genuine..... 50
Girard Standard....dis 50 & 10
Mechanics' 10 and 10....dis. 50
P. S. & W. Mechanics dis 50&10
Agricultural.....dis 70

Wire.

Brass and Copper.....dis 30
Bright & annealed, Nos. 0 @ 18 dis 50@55
" " Nos. 19 @ 26 dis 60
" Nos. 27 @ 36 dis 65
Coppered Nos. 0@18, dis 45@50
Galvanized, Nos. 0@18, market list,..... dis 45@50
Tinned, Nos. 0 @ 18, dis 45@47½
Cast steel.....dis 40
Tinned Broom Wire, Nos. 18@25.....dis 55
Annealed Fence, Nos. 8 and 9..... dis 60
Annealed Grape, Nos. 10 to 14..... dis 60
Galvanized Telegraph, Nos. 7 to 9 ..... ℔ l
Galvanized Telegraph, Nos 10 to 11..... ℔ lb 8¼c
Galvanized Telegraph, No. 12..... ℔ lb 10½c
Fence staples... ℔ lb 5½@5¾c
Fence Staples, galvanized, ℔ lb 6½@6¾c
Stubs Steel Wire $6.00 to dis 30
Barb Wire, painted 7⅛8
Barb Wire, galvanized .. ⅝c
Crucible Steel Ropes fro ⅜ in. at 9c to 1¼ in. at.....52c
Best Selected Iron Ropes from 3-16 in. at 3c. to 1¼ in. at..... 33c

TINNER'S STOCK.

Tin.

Banca,.....per lb.	23⅛
Straits..... "	22½c
English..... "	23c
Bar "	24½c

Tin Plate.

IC 12x12 charcoal .....$	6 75
IC 14x20 do	6 45
IX 14x20 do	8 20
DC 12½x17 do	7 00
DX 12½x17 do	9 00
DXX, 12½x17 do	11 00
DXXX, 12½x17 do.....	13 00
IC, 20x28 do	13 75
IX, 20x28 do	17 25
IC, 14x20, Best Roof...	6 00
IX, 14x20, do	8 00
IC, 20x28 do	12 00
IX, 20x28 do	16 00
IC, 10x14 Best Coke.....	6 00

Subject to card discount.

Solder.

Half and Half, in bars.....15
No. 1 do 14
Spelter Solder..... 25

Pat Planished Sheet Iron

[A] ..... per lb 10½c
[B] ..... " 9c

Nos	10	15	21	25
to	14	20	24	& 26
Com	3-10	3-30	3-40	3-75
Char	5-60	5-60	6-00	6-20

Sheets over 28 in. wide ¼c extra.

Zinc.

Sheet, cask..... 6½c
Sheet, open..... 7c

BRASS.

Cash prices for Roll and Sheet Brass. For less quantity than 100 lbs. add 3c per lb.

High Brs.

All Nos not thinner than 10 No. 28, wider than 2 in. not wider than 14 inch 30c
All Nos to No. 28 inclusive, and widths over 14 to 20 in. inclusive 35c
All Nos to No. 28, inclusive, and widths over 20 to 30 in. inclusive 38
¼c per lb advance on each No above Nos 28 to 38, inclusive.
All Brass thinner than No. 8 is Platers' Brass at 53c
Sheets 24x48, and all sheets cut to particular sizes and lengths under 30 inches, in width wider than 2 inches 37c

Low Brass.

4c pr lb. more than High Brass
Gilding metal 8c per lb. more than High Brass.
Platers' or Gold Metal
In Bars 48c
Sawed 51c
Planed or Polished...54c

For Slitting.

Metal in width in. to ⅛ in. to No. 28, inclusive, 1c per lb, advance.
Metal, in width 2 in. to 1 in. thinner than No 28, 2c per lb. advance
Metal, in width ⅛ in to ¼ in thinner than No 28, 5c per lb advance.
Metal ¼ in. in width and less, 10c per lb. advance.
Any of the above widths cut to particular lengths add 7c per pound.

COPPER.

Lake Ingot.....15¼@16c
Baltimore..... 15 @15¾
Arizona ..... 15@15¼c

sheathing Brazier Copper, Bolts, etc.
All sizes, 16 oz. per sq. foot. and over, per lb 25c
" and over per lb.....25c
Brazier's Copper, ordinary sizes, under 16 oz. and over 12 oz. per sq. foot, per lb. 25c
Brazier's Copper, 10 oz and 12 oz. per sq. ft...per lb. 27c
Brazier's Copper lighter than 10 oz. per sq. ft...per lb. 34c
Circles less than 84 inches in diameter ... per lb. 33c
Circles 84 inches in diameter and over .....per lb. 30c
Segment and Pattern sheets per lb. 33c
Locomotive Fire Box sheets per lb. 30c
Sheathing Copper, over 12 oz. per sq. ft... per lb. 24c
Bolt Copper.....per lb. 28c
Copper Bottoms per lb. 31@32c
No copper is Sheathing except 14x10 inches, and not to exceed 34 oz. to the sq. ft.

Tinning.

14x48 ..... per sheet 6c
All other size sheets, 2½c per square foot. For tinning both sides, double the above amount

LEAD.

Amerc'n, ℔ lb.....	4½c
Bar, ℔ lb	5½c
Pipe, ℔ lb 6¾c dis 10 per c	
Sheet, ℔ lb 7½c dis 10 per ct	
Tin-lined pipe 15c dis 10 per ct	
Block	45c.
Chilled Shot...	8c

Babbitt Metal.

Babbit Metal, No. 3, 14 X...	42
Babbit Metal, No. 2, 16 XX..	46
Babbit Metal, No. 1, 18 XXX..	50
Babbit Metal, C.....	20
Babbit Metal, B.....	24
Babbit Metal, A.....	32

Dis 40 per cent.

IRON AND STEEL.

Flat Bar.

1½ to 4 by ⅜ to 1 inch.....	1 90	
4½ to 6 by ⅜ to 1 inch.....	2 00	
1¾ to 6 by 1¼ to 1½ inch	2 30	
1¼ & 1½ by ⅜ to ¾.....	2 00	
1 & 1¼ by ⅜ to ¾.....	2 10	
⅝ ¾ and ⅞ by ⅜ to ¾.....	2 30	

Round,

1 to 1⅞ inch	2 00	
2 to 2¾	2 10	
2¾ to 3¼	2 40	
3¾ to 4	2 90	
4¼ to 4¾	3 40	
4¾ to 5	3 60	

Square.

1 to 1⅞ inch	2 00	
2 to 2¾	2 10	
2¾ to 3¼	2 40	
⅞ to 4	2 90	
3¾ to ⅞	2 00	

Heavy Band.

1½ to 6 by ¼ and 5-16 inch 2 10
1 to 1¾ by ¼ and 5-16 do 2 20
⅝ to ⅞ by ¼ and 5-16 do 2 40
⅝ to ⅞ by ½ and 5-16 do 2 80

Half Oval and Half Round.

Wagon box iron ¼ and ⅜ 3 50
1-10c per lb extra will be charged for cutting to specified lengths

Light Band.

1½ to 6 by ¼ to 3-16..... 2 70

Hoops.

1½ to 2 , Nos 16 to 18..... 3 10
1½ to 4 do 13 to 15..... 3 00
1-10 extra for each gauge lighter

Sheet Iron.

No 22 to 24.....	3 50
No 25 to 26.....	3 70
No 27.....	3 90
No 28	4 30

English Steel.

Best cast..... ℔ lb	16c
Extra cast.....	16½c
Round machinery..	10c
Swaged, cast	18c
Best double shear ...	15½c
Blister, 1st quality..	13c
Refined tool steel....	16½c
Spring calking	7½@7½c
German steel, best ..	11c
2d quality	10c
3d quality	9c
Sheet cast steel, 1st quality	15½c
2d quality	14½c
3d quality	12½c

American Steel.

Best brands of refined cast steel, ⅜ to 2 inches..	12c
Crucible cast	7c
Open-hearth ditto....	4½c
Hammer cast steel ...	9c
Spring cast steel.....	7½c
Bessemer and open-hearth spring.....	5c
Ditto plow	4½c
Steel boiler plate	6½@7c
Bessemer machinery 5	@6c
Spring and calking ...	7½@7½c
Tire	5
Sleigh shoe.....	5

Bessemer Steel Tire.

⅜ to 1 by 3-32 ..... 4½ ℔ lb
⅜ to 1 by ½ to 5-32 ... 4½ ℔ lb
⅜ to 1 by 3-16 to ⅜ ... 4½ ℔ lb

Miscellaneous Cast Steel.

Auger and auger bit.....	10
Axle steel for wagons.....	7
Frog points and plates....	8
Frog size bars	8
Pick, hammered.....	10½
Mattock, beveled.....	9
Table cutlery.....	7½
Trap spring steel.....	10
Pike and cant hook.....	8½
Coal and granite.....	9

SCRAP IRON AND OLD METAL.

[Reported by H. L. & E. A. Schwarzenberg.]

DEALER'S BUYING PRICES

	Per Ton.
No. 1 R R wro't scrap....	$20
No. 1 wrought scrap.....	20
No. 1 Machine cast scrap.	15
Stove plate (free from burnt iron).....	11 00
Grate bars	7
Pipes and flues (clean)....	14
Tank iron.....	14
Hoop and band iron.....	10
Light sheet iron.....	9
Axle turnings.....	15 00
Wro't turning (f from cast)	13
Wro't iron, oily drillings.	9
Cast borings.....	8 50
Malleable iron.....	9
Uncut wro't iron boilers..	15
Old copper per lb.....	11
No. 1 H. Brass per lb.....	11
Heavy yellow Brass do..	9@10
Light Brass per lb.....	7@9
Scrap Zinc per lb.....	3@4
Tea Lead per lb	3
Heavy Lead per lb	4

PIPE, WROUGHT.

Standard Wrought Iron Lap Welded Steam and Gas Pipe

Inside Diameter, Inches.	Plain, Price Per Foot.	Galvan. or Enameled Per Foot.	Outside Diameter Inches.	Weight Per Foot.
⅛..	08		.40	.24
¼..	08	$0 11	.54	.42
⅜..	09	12	.67	.56
½..	11	15	.84	.85
¾..	13½	19	1.05	1.13
1 ..	19	28	1.31	1.67
1¼..	27	40	1.66	2.28
1½..	33	47	1.90	2.69
2 ..	46	64	2.37	3.66
2½..	75	1 00	2.87	5.77
3 ..	95	1 30	3.50	7.55
3½..	1 25	1 70	4 00	9.05
4 ..	1 50	2 05	4.50	10.73
4½..	1 75	2 40	5.00	12.49
5 ..	2 25	3 00	5.56	14.56
6 ..	2 75	4 00	6.62	18.76
7 ..	3 75	....	7.62	23.00
8 ..	4 75	....	8.62	28.00
9 ..	6 50	....	9.68	34.44
10 ..	8 00	....	10.75	40.64
12 ..	12 00	....		54.65

Discount, car load lots, 70 and 10 per cent. Less than car load 70 to 70&5.

COAL,

WHOLESALE.

Wholesale f.o.b. cars at Cleveland:

Carbon Hill and Monday Creek.....	$2 50
Massillon	2 70@2 80
Palmyra, lump.....	3 25
Brier Hill.....	3 50
Pittsburgh.....	3 00
Salineville.....	2 25
Tuscarawas.....	2 40
Anthracite grate.....	5 18
Anthracite egg.....	5 27
Anthracite stove	5 49
Anthracite chestnut.....	5 49

RETAIL.—Delivered.

Massillon Lump.....	$4 00
" Nut.....	3 75
Carbon Hill and Monday Creek, lump	3 50
Carbon Hill and Monday Creek, nut	3 25
Straitsville, lump.....	3 75
Straitsville, nut.....	3 50
Palmyra, lump.....	4 50

75c less on cars by car load.

Anthracite Stove and Chestnut	6 25
Egg and grate	6 00

OILS.

Pure Oils. p'kages included	
Sperm, winter bleached per gal.....	1 90@1 83
Whale, winter bleached per gal.....	66@69
Straits	48@52
Bank.....	46@50
Lard oil extra W S..	83@85
do No 1 do.....	73@75
do No 2 do.....	63@65
Tallow oil.....	73@76
Neatsfoot oil pure..	95@$100
do No 1	80@85
Linseed oil, raw	57@60
do do boiled	60@63
Cotton seed oil white	58@62
do do yellow	57@61
West Virginia lubricating 28 deg.....	18c@25c
Paraffine oil winter pressed.....	22@25
Capitol Cylinder.....	85
Model do	65
Eldorado Engine..	50
Turpentine, per gal..	43

GLASS.

(Per box of 50 feet)

SINGLE THICKNESS

6x8 to 10x15	
11x14 to 15x24.....	8 50
16x24 to 20x28.....	9 75
15x34 to 24x30.....	10 75
26x28 to 24x36.....	11 50
26x36 to 26x44	13
26x46 to 30x50.....	14 00

DOUBLE THICKNESS Dis60&10

6x8 to 10x15.....	11 7
11x14 to 15x24.....	13 25
16x24 to 20x28.....	15 75
15x34 to 24x30.....	17 25
26x28 to 24x36.....	18 50
26x36 to 26x44.....	[illegible]

Di

Manufactures.

[Continued from Page 4.]

there is no reason why Ohio should not take the lead in this matter, and the Youngstown Malleable Iron Co. evidently mean she shall. Success to them.

AFTER being worked three years under lease to Joseph Corns & Son, the Massillon Rolling Mill has passed into their absolute control. It is the intention to enlarge the works considerably, increasing also the working force, which now consists of 150 men. The mill has been running uninterruptedly during all the recent period of depression and uncertainty in the iron trade and has the most flattering prospects. Mr. Corns was in Cleveland the past week buying new boilers and arranging for other improvements. No more experienced iron-makers can be found in Ohio than the Messrs. Corns, and their many friends will heartily congratulate them.

IN GENERAL.

A FURNACE in New Castle, Pa., is engaged in filling an order for 6,000 tons of Bessemer iron.

THE Indianapolis Rolling Mill made its first steel rail on June 21st, the new steel rail mill now being ready for work.

ONE of the furnace stacks of the Stewart Iron Co., of Sharon, Pa., is out of blast and workmen are engaged in raising it. When completed the total height will be 70 feet.

THE largest weekly production of iron made by a furnace in Sharpsville was that produced by Spearman No. 2 last week, the out-put being 728 or tons or 100 tons per day.—[Youngstown News-Register.

THE U. S. Car Co., of Boston, Mass., were justly awarded the silver medal at the Chicago Exposition for their dump car. The company has lately elected A. P. Jaques President; C. L. Van Wormer, General Manager, and M. Van Wormer, Superintendent of Construction.

EDWARD C. POST, Toledo, notifies the TRADE REVIEW to the following effect, under date of July 2: "I take pleasure in informing you that I have formed a co-partnership with the Middlebrook Elevator Co., of Detroit, Mich., and that after this date we shall continue the elevator business on an enlarged scale, under firm name of The Middlebrook & Post Manufacturing Co., of Detroit, Mich."

THE Edison Company for Isolated Lighting carried off the contract for lighting the Louisville Exposition building and annexes with 4,600 Edison incandescent lights of 16 candle-power each. This is the largest building ever contracted to be lighted by electric light. The plant will be larger than that at the London Electrical Exposition last year. The wire required for the purpose will measure forty miles in length, and will weigh 40,000 pounds. The plant will cost $100,000.

H. K. PORTER & Co., this city, have under way at their Light Locomotive Works, a locomotive for pushing rail blooms at the Scranton Steel Works. It weighs about three tons and is only two feet gauge. The cylinders are five inches diameter and ten inches stroke. There is no cab, as it will run inside of the steel mill. This is the smallest locomotive ever built in Pittsburgh, if not the smallest built in this country, for practical use.—[Pittsburgh Telegraph.

THE following tools were exhibited at the Chicago Exposition by the Machine Tool Works (formerly Ferris & Miles), of Philadelphia: One car and locomotive axle lathe, and one car wheel boring machine 50 inches swing; one car wheel hydraulic press opening 46 inches, one car 54 inches swing double wheel lathe; 16 inches stroke slotting machine; one car 30 inches square and 10 feet planing machine with quick return of table 100 feet per minute: one 6 foot arm, universal radial drill, one single punching machine for 2 inch holes in 1¾ inches iron; one 30 inches swing upright drill, one 1100 lbs single frame steam hammer with diagonal ram and abjustable guide.

ADVERTISE in the TRADE REVIEW.

Beton in Combination with Iron as a Building Material.

[Continued from Page 7.]

nices, stiles, and panels of the ceilings are formed of beton, and covered with the hard finish usual in such work. There appears to be no limit to the reproduction in beton of any form used in stone masonry or in stucco. The proportions of material composing the beton for the work varied in strength to meet the requirements of the different parts of the structure; the heavy walls needing the least proportion of cement, while the beams, floors and roofs required a much larger proportion. Only the best quality of Portland cement, clean beach sand, and crushed blue-stone were used in combination with iron for constructing the building.

The proportions of cement used for the heavy wall work were one part of cement to four parts of sand and fine gravel, thoroughly mixed dry, and dampened with only sufficient water to give it the consistency of well-tempered moulding sand.

A finely crushed and screened, hard, blue lime-stone was found to be better adapted for use in combination with the beton than a coarse sized stone filling, because small sized stones pack closer than large ones, thereby realizing a proportional saving in cement. The tests made to ascertain the comparative transverse strength of different compositions proved thav the bond was stronger in beton made with small stone. In breaking test sections made of beton in the form of bricks, the fracture of those filled with small stone was almost invariably across the stone lying in the line of fracture, while the fracture of the test bricks made with a filling of stone three or four times larger, showed a frequent tearing away from the bond between the the beton and the larger stone filling, the composition of the beton being the same in both cases.

The proportions of cement and coarse beach sand and gravel, used in re-enforcing iron beams for floors and roof supports, were one part of cement to two parts of sand and gravel. The size of the iron beam, selected for an experimental test, was a four-inch I beam of lightest pattern, twelve feet long, weighing thirty pounds to the yard, and its safety load was limited to eleven hundred and fifty pounds. A plank mould was made the length of the iron beam, twelve inches deep by five inches wide, in the bottom of which a layer of beton was first moderately tamped down to an inch in thickness; then the iron beam was laid on the course at equal distances from each side of the mould, and settled down on the surface of the course of beton to a good bearing. This brought the top surface of the beam seven inches below the top of the mould. The work of filling and tamping the courses was then continued until the mould was filled.

The reason for placing the iron beam so near the bottom of the mould, was to utilize its tensile quality for resisting the strain below the neutral axis when this composite beam was exposed to heavy loads, while the beton above this line was relied on for resisting compression from load strain. The beton became thoroughly hardened in about thirty days, when the following tests of transverse strength were made. It was placed upon suitable supports, with a bearing of three inches at each end. A lever was adjusted so as to bring the testing load on a knife-edge bearing at the center of the beam. Weight was then applied to the long end of the lever, until the stress on the center of the beam reached nine thousand five hundred pounds. Under this load there was a deflection at the center of the beam of seven-sixteenths of an inch, but not a sign of rapture appeared at sny point.

The load was then removed, and the beam returned to the original line it occupied before the test, showing that the combination possesses the essential quality of elasticity in addition to the enormous increase of capacity to resist strain over that which was possible for either material to sustain if used separately, and in the quantity.

It is suggested that for future construction an inverted ⊥ beam would furnish a preferable distribution of iron in the composite beams than the I beams which were used.

The result of this experiment demonstrated the reliability of the composite beam of iron and beton, and showed that the adhesion of the cement to the iron could be relied on under heavy stains: and warranted the adoption of beton re-enforced with small rods for the floors and roofs.

The beams for supporting the floors throughout the house were placed at such convenient distance apart as to insure perfect safety to the floors, and, at the same time, affording ample opportunities for producing the best effects in deep, paneled ceilings.

The beams were all moulded in position, where they belonged, both for the floors and roofs, and after the same method that the experimental beam was made. The iron beams varied in width and weight per yard in accordance with their length and the prospective load; the largest being nineteen feet long by seven inches wide. When the combination beams were completed and ready for the floors and roofs, heavy planks were firmly placed in position and securely supported between the beams; the upper surface of these plank foundations being adjusted on a level with the top surface of the moulded beams. These planks served as the bottom of the floor moulds, and after the beton comprising the floor was hardened, they were removed.

Channel ways had been moulded in the walls, on a line with the top of the beams, for the purpose of supporting the outer edges of the floors.

Before the floors and roofs were laid, care was taken to cover all the supporting surfaces with paper, to prevent the adhesion of floor and roof sections to their supports. This precaution was necessary, to permit the movement of the floors and roofs that would unavoidably take place under varying temperatures and loads.

A part of the experimental system contemplated an attempt to warm the house by passing currents of heated air between the floors and ceilings, and up through flues, made in close proximity to each other, for that purpose, in the interior walls of the building, and it was necessary to core out a liberal area of lateral openings through the upper portion of the beams, in order to permit a free circulation of heated air. The ceilings rested upon flanges projecting from the lower portion of the beams.

Instead of using sand and gravel, or both, in combination with cement, for floor and roof construction, the preliminary experiments that proved the superior value of broken blue stone for massive work, led to the adoption of washed, fine screenings from the same material for the floors and roofs, because its greater angularity than gravel insured a stronger bond in the work than could be realized by using sand and gravel.

The proportions of materials used for this purpose were: one part of Portland cement to two parts of the fine stone screenings. The preparations being completed for laying down the floors, a thin course of the beton was first put on, and evenly tamped down, to about an inch thickness, over the whole space intended to be covered. Then rods of iron, five-sixteenths of an inch in diameter, were placed both longitudinally and laterally, at a uniform distance of eight inches apart. over the whole surface. Then, on this, a final layer of two inches in thickness was carefully tamped down. In about eight hours, the beton hardened sufficiently to allow the application of the top surface, which was floated down with a half-inch coat of cement and fine beach sand mortar, made of equal parts of each. This completed the final finish, and made the whole thickness of the work three and a half inches. It will be observed that for the same reason as in beam construction, and, as before explained, the iron rods for re-enforcing were placed near the bottom of the work, so as to resist the tensional stresses due to the load, while that due to compression in the upper portion would be sustained by the beton alone. In this manner, and by this process, over thirteen thousand square feet of flooring and roofing were constructed to fill the requirements of the building.

[Concluded next week.]

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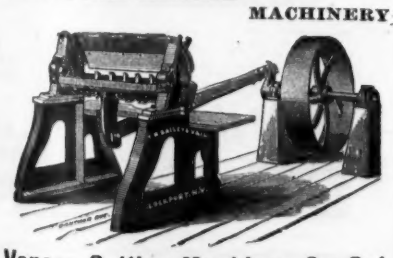

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Also Second-hand Machinery of all kinds.

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GRINDSTONES.

The best in the market

FOR WET AND DRY GRINDING,

AND FAST CUTTING.

Manufactured in sizes from 3 feet 6 inches to 8 feet in diameter; in thickness from 6 inches to 25 inches. Orders solicited.

82 JOHN H. O'MARA.

THE longest bridge in the world is in China, at Sangang, over an arm of the Chinese Sea. It is 5 miles long; the roadway is 70 ft. high, and stands upon 300 arches. The parapet is a balustrade, and each of the piliars, which are 75 ft. apart, supports a pedestal on which is placed a lion, 21 ft. long, made of one block of marble.

Making Tacks.

The iron is received from the rolling mills in sheets from three inches to twelve inches wide, and from three feet to nine feet in length, the thickness varying, according to the kind of work into which it is to be made, from one-eighth to one-thirty-second of an inch. These sheets are all cut in about thirty-inch pieces, and by immersion in acid, cleaned of the hard outside flinty scale. They are then chopped into strips of a width corresponding to the length of the nail or tack required. Supposing the tack to be cut is an eight-ounce carpet tack, the strip of iron, as chopped and ready for the machine, would be about eleven-sixteenths of an inch wide and thirty inches long. This piece is placed firmly in the feeding apparatus, and by this arrangement carried between the knives of the machine.

At each revolution of the balance wheel the knives cut off a small piece from the end of this plate. The piece cut off is pointed at one end and square for forming the head at the other. It is then carried between two dies by the action of the knives, and these dies, coming together, form the body of the tack under the head. Enough of the iron projects beyond the face of the dies to form the head, and while held firmly by them, a lever strikes this projecting piece into a round head. This, as we have said before, is all done during one revolution of the wheel, and the knives as soon as the tack drops from the machine, are ready to cut off another piece.

These machines are run at the rate of about 250 revolutiohs per minute. The shoe nail machines, for cutting heedless shoe-nails, are run at about 500 revolutions per minute, and cut from three to five nails at each revolution.—[Mechanical Engineer.

New Features of the Stove Trade.

It is already evident that the very best genius of the stove-making trade has been applied upon the construction of square, high art base heating stoves for the present season. The lessons from experience learned last year have been made the most of in the improvement of previous constructions, and have enabled those bringing out new patterns to avoid the difficulties which operated against the successful working of some of those first made. The result has been the production of superb stoves, beautiful in design and satisfactory in working efficiency, The square shape has great advantage over the round in capability of artistic ornamentation, The opportunity which the square form gives for the substitution of tiles, bronzes, and art castings in iron, in place of the excessive application of nickel to round stoves as witnessed the last two or three seasons, is great. And now that working qualities have been secured which have stood the severest tests, the square stoves should, and doubtless will, command such public favor as shall return to manufacturers the large sums spent upon designs and patterns, and insure a staple trade for some years to come.—[American Artisan.

Usefulness of Young Workmen.

The possibility of greatly increasing the usefulness of young workmen by systematic training in the use of tools, has been sufficiently demonstrated in the Mechanical Handiwork Department of the Spring Garden Institute, Philadelphia. That boys can be so educated, while at the same time receiving the public school education, not only without injury to the health, but with positive benefit thereto, has been demonstrated in the Manual Training School of St. Louis. The boys have given about two hours a day to practice in the shops, and have continued their other studies in the public schools. The Manual Training School is organized on the Russian system, and is intended to educate the hand and eye for all kinds of tools, and not to teach particular trades. These, it is held, can be readily acquired by the trained boys when they have determined what occupation they will follow. All the pupils are taught drawing as a necessary part of their mechanical training.—[Boston Com. Bulletin.

Scale of Hardness of Common Metals.

A new scale for comparing the hardness of metal has been compiled by Mr. Galliner, who in his experiments used small cylinders with conical points, and passed them loaded up to five kilogrammes over polished plates of the respective metals, from which they did not materially differ in hardness. Thus he found, indicating the hardness of pure soft lead by 1, that tin is represented by 2; hard lead by 3; copper, 4 to 5; metal for bearings (85 copper, 10 tin and 5 zinc), 6; tempered cast iron, 7; fibrous wrought iron, 8; grey cast iron, 10 to 11; mild steel, 12 to 13; crucible steel, blue, 14; violet, 15, straw color, 16; hard bearing metal (83 copper, 17 zinc), 17; and very hard steel, 18.

The proportions of glycerine and alcohol to be used on oilstones vary according to the instrument operated upon. An article with a large surface—a razor for instance—sharpens best with a limpid liquid, as three parts of glycerine to one of alcohol. For a graving or any similar tool, the cutting surface of which is very small, as is also the pressure exercised on the stone if sharpening, it it necessary to employ glycerine almost pure, with but two or three drops of alcohol.

THE wonders of telegraph unfold themselves more marvellously each day. The electrician's victories are not confined to the land, and the project of mid-ocean telegraph stations is now declared a hopeful one. The absent one need no longer regard himself as cut off from home because he is afloat, and the coming storm can be heralded to vessels in all parts of the ocean adjacent to sub-marine cables. Floating stations, communicating with these cables are to form the means for mid-ocean dispatches, sent from the passing vessel to those ashore. The possibilities of the plan are decidedly interesting. —[Pittsburgh Telegraph.

THE Mechanical World says: "A non-conductor of electricity has yet to be found, for all substances hitherto discovered are conductors of the force, under certain known conditions; but those which offer a great resistance to it, serve the purpose of non-conductors in practice, although they may be all classed as good or bad conductors. The best conductor at present known, is silver; the worst conductor is solid paraffine."

TRAVELERS' REGISTER.

Lake Shore & Michigan Southern.

TRAINS GOING EAST.	Arrive. From West.	Depart. From East.
Fast N. Y. Express	*1 35 a m	*1 50 a m
N.Y.,Bo't'n & At. Ex.	*7 05 a m	*7 30 a m
Elyria Accommodation	†8 35 a m	.....
Pt.Clinton Accomd'at'n	†11 00 a m	.....
Buffalo Accommodation	†11 00 a m	†11 15 a m
N. Y and B't'n Fast Ex.	*2 25 p m	*2 55 p m
Conneaut Accom'dation	.....	†4 50 p m
Night Express	†10 10 p m	†10 35 p m
TRAINS GOING WEST.	**Arrive. From East**	**Depart. From west.**
Fast Limited Express	*12 23 a m	*12 33 a m
Mich. Ex. via Sandusky	*2 50 a m	*3 05 a m
Chi. Ex. via Sandusky	†6 35 a m	7 00 a m
Mich. Ac. via Norwalk	.....	†6 40 a m
Conneaut Accom'dat'n	†8 40 a m	.....
Toledo Ex. via Norwalk	†1 25 p m	†3 30 p m
St. Louis Ex.via San'ky	*1 40 p m	*2 05 p m
Chi. Pac.Ex. via Nor'lk.	*7 05 p m	*7 35 p m
Pt.Clinton Accom'dat'n	.....	†5 00 p m

Sunday trains for Nottingham—Depart 6:00 a. m. and 2:15 p. m., return at 10:05 a. m. and 4:45 p. m.

Reference marks—*Daily. †Daily except Sunday. ‡Daily except Monday.

Cleveland, Columbus Cincinnati & Indianapolis.

ARRIVALS.

No. 2 Col. & Cin. & Ind'polis Ex.	*7 10 A.M
No. 8 C. T.V. & W. & Clev. Accom.	10 25
No. 12 St. Louis & New York Exp.	*3 20 P.M
No 6 Indianapolis & Columbus Exp	10 20
No. 4 Columbus & Cincinnati Exp.	*3 50
No. 10 Wheeling Express	7 15
No. 14 Cincin. New York fast line,	1 40 A.M

DEPARTURES.

No. 1 Cincinnati & Columbus Exp.	*8 00 A.M
No. 11 Cleve, Indianap.&Wheel'g Ex	7 10
No. 3 Special St. Louis & Cin. Ex.	**2 15 P.M
No. 5 Night Express,	*7 10
No. 7 C.T.V. & W. & Col. Accom.	4 00
No. 17 Spec. Col. Cin'ti. Exp.	1 50

**This train runs daily to Indianapolis and St. Louis, and daily, except Sunday, to Cincinnati.

Cleveland, Tuscarawas Valley & Wheeling.

ARRIVALS.

Wheeling & Cleveland Express	7 15 P.M
Uhrichsville Express	10 15 A.M

DEPARTURES.

Wheeling & Cleveland Express	7 10 A.M
Uhrichsville Express	4 00 P.M

New York, Pennsylvania & Ohio.

ARRIVALS.

No. 1 New York Expaess	* 6 40 a.m.
No. 7 Mahoning Valley Ac	11 55 a.m.
No. 5 Fast N. Y. & Pitts. Ex	* 1 40 p.m.
No. 3 N. Y. & Pittsburgh Ex	* 7 05 p.m.
No. 9 Youngstown & Pitts. Ac	10 15 p.m.

DEPARTURES.

No. 12 N. Y. & Pitts. Express	* 7 20 a.m.
No. 6 Youngstown & Pitts Ac	11 05 a.m.
No. 4 Fast N. Y. &Pitts. Express	* 2 50 p.m.
No. 2 Mahoning Accommodation	4 35 p.m.
No. 8 N. Y. and Pitts. Express	11 05 p.m.

* Sunday trains.

Cleveland & Pittsburgh.

	ARRIVE.	DEPART
Pittsburg & Wheeling	2 30 P.M	8 25 A.M
Express	7 30	2 00 P.M
Alliance Accommodation	10 10 A.M	3 45
Ravenna Accommodation	8 37	5 30
Night Express	6 25 A.M	†11 40 P.M
Newberg Accom'dation	12 10 P.M	11 00 A.M
Newberg Accom'dation	1 50 P.M	12 30 P.M

† Night Express runs daily, except Saturday, by way of Wellsville, and on Saturday by way of Alliance.

Valley Railway.

	ARRIVE.	DEPART
Wheeling Junction	10 15 A.M	8 30 A.M
Canton	1 30 P.M	5 00 P.M
Wheeling Junction	6 15 P.M	3 20 P.M

Special trains leave on Sunday at 8.25 A. M. and 4.20 P. M., arriving at Cleveland at 1005 A. M. and P. M. 6.25

Depot foot of South Water Street.

Connotton Valley Railway.

	ARRIVE.	DEP
Passenger	8 00 a. m.	8 10
Passenger	10 20 a. m.	2 00
Passenger	6 35 p. m.	4 25 p.m.

Depot corner Commercial and Fifth Streets

Cleveland, Akron & Columbus Railroad,

Cleveland, Akron & Columbus Railroad, running over Cleveland & Pittsburgh Rail road to Hudson, for Akron, Columbus, etc.

	ARRIVE.	DEPART.
Mail	2 30 P.M	8 25 A.M
Express	7 30	2 00 P.M
Accommodation	10 10 A.M	3 45 P.M

"The Nickel Plate."

	ARPIVE.	DEPART
Local Passenger	10 00 P.M	3 48 P.M
Local Passenger	9 18 A.M	6 55 A.M
Conneaut Accom'dation	9 05 A.M	4 30 P.M

Cleveland to New York,

VIA THE

NEW YORK, PENNSYLVANIA AND OHIO RAILROAD.

[Formerly Atlantic & Great Western Railroad]

For New York, Boston and the East. The shortest and quickest route to Pittsburgh Washington, Baltimore and the Southeast.

Until further notice trains will leave the new Central Depot, South Water Street and Viaduct, as follows:

7 20A.M. LIGHTNINGEXPRESS(daily) sleepingand hotel coaches from Leavittsburg, 9:05 a.m. To New York, Albany and Boston without change. Parlor car, Cleveland to Salamanca. Arrives at Meadville 11:20 a.m.,(dinner); Franklin, 12:33 p.m.; Oil City, 1:00 p.m.; Corry, 1:00 p.m.; Jamestown, (Lake Chatauqua) 1:57 p. m.; Buffalo, 6:15 p. m.; Rochester, 8:30 p.m.; Hornellsville, 6:40 p. m., (supper);Corning, 8:25 p.m.; Elmira, 8:57 p.m.; Binghampton, 10:58 p.m.; Albany, 6:00 a.m.; Boston, 2:45 p.m.; arriving at New York, 6:50 a.m.

2:50P.M. LIMITED EXPRESS, Pull-Sleeper Cleveland to New York, (daily). Arrives at Meadville, 6:55 p m.; Jamestown, 9;13 p. m.; Salamanca, 10:10 p. m.; Now York, 10:25 a. m.

11:25 P.M. NIGHT EXPRESS, (daily except Sunday), Sleeping Coach from Leavittsurg to New York without change. Arrives at Youngstown, 1:45 a.m.; Pittsburgh, 6:15 a. m.; Washington 9:15 a. m.; Baltimore 10:34 p. m.; Meadville, 3:50 a. m.; Corry, 5:20 a.m.; Jamestown, 6:22 a.m.; Buffalo, 9:45 a. m.; Rochester, 1:10 p. m.; Hornellsville 1:20 a. m.; Corning, 12:58 p. m.; Elmira 1:21 p. m.; Binghampton, 2:50 p.m.; New York 9:25 p.m.

2:50 P.M. PITTSBURGH EXPRESS, daily through without change. Parlor Car, Cleveland to Pittsburgh, arrives at Youngstown, 5:00 p.m.; Pittsburgh, 7:48 p.m.; Washington, 7:30 a.m.; Baltimore, 8:19 a.m.

4:35 P.M. MAHONING ACCOMMODATION, stopping at all way stations. Arrives at Youngstown, 7:25 p.m; Sharon, 8:30 p.m; Sharpsville 8:40 p. m; connects at Leavittsburg with train No. 20 for Meadville and intermediate points, arrives at Meadville, 11:05 p.m. Pittsburgh, 10:48 p. m.

7:20 A.M. PITTSBURGH EXPRESS, —(daily) through without change. Arrives at Youngstown, 9:50 a.m.; Sharon, 10:55 a.m.; Sharpsville, 11:05 a.m.; Pittsburgh, 12:45 p.m. Returning, leave Pittsburgh, 4:48 a.m., 8:33 a.m., and 1:13 p. m. and 4:20 p.m.

11:05 A.M. YOUNGSTOWN& PITTSBURGH Accommodation, stopping at all Way Stations, arriving at Youngstown 1:50 p.m.; Pittsburgh, 6:10 p.m. Trains arrive at Cleveland, 6:40 a.m., 7:05 p. m., 10:55 a. m 1:40 p.m., and 10:15 p.m.

☞ This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City, and intermediate points WITHOUT CHANGE. No change to Boston and New England cities.

Baggage Checked Through to All Points East

☞ Through Tickets and information regarding the route can be obtained at the office 131 Bank street, and at newDepot of New York, Pennsylvania and Ohio Railway, South Water street and Viaduct, Cleveland.

A. E. CLARK,
Gen. Pass'r. Agt., Cleveland, Ohio.
M. L. FOUTS,
Pass. Agt.,131 Bank st.,
Cleveland.

J. M. FERRIS,
Gen. Man'gr, Cleveland

TIME TABLE.
CLEVELAND & PITTSBURGH
RAILROAD.

On and after Sunday, January 21st, 1883, trains depart from and arrive at Union Station, Cleveland, (city time) as follows:

DEPART.

For the East--8:20 A.M.; 1:55 P.M., 11:35 P.M
For Alliance--3:40 P.M.
For Ravenna--5:25 P.M.
For Newburgh--10:55 A.M; 12:25 P.M.
On Sunday for the East, at 11:35 P.M.

Train leaving for the East (week days) at 1:55 P.M. has sleeping car through to Philadelphia and New York.

Train leaving for the East every night at 11:35 has sleeping car to Pittsburgh.

On Saturday night the train for the East leaving Cleveland at 11:35 runs from Alliance to Pittsburgh via P.F.W. & C. Railway.

ARRIVE--(Week Days.)

From the East--6:20 A.M.; 2:25 P.M.; 7:25 P.M
From Alliance--10:05 A.M.
From Ravenna--8:32 A.M.
From Newburgh--12:05 P.M.; 1:45 P.M.

Time tables, rates of fare, through tickets and further information can be obtained from M. G. Carrel, agent, Union Station, or C. L. Douglass, No. 212 Bank street.

WM. A. BALDWIN, Manager,
E. A. FORD, Gen. Pass. Agt.
Pittsburgh, Pa.

Bee Line.

Cleveland, Columbus,Cincinnati & Indianapolis Railway.

The Great Central Trunk Route to the Ohio and Mississippi Rivers.

Three Trains Week Days,

TWO TRAINS SUNDAY.

Leave Cleveland with Through Palace Coaches and Elegant Sleeping Cars for

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Indianapolis, Terre Haute

and St. Louis

Without Change.

This is the only line making Direct Connection with all the principal Trunk Lines of the East for all Southern, Southwestern and Western points, either by way of Cincinnati, Indianapolis or St. Louis for all railway towns in Missouri, Arkansas, Texas, Kansas, Nebraska, Colorado, New Mexico, Old Mexico and the Pacific Coast.

Equipment New and Comprising all Modern Improvements.

The Best Roadbed and Safest Road in the West.

Tickets by this popular route for sale at all regular ticket offices.

E. B. Thomas, General Manager. **O. B. Skinner,** Traffic Manager.

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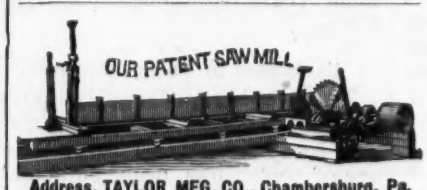

Address, TAYLOR MFG. CO., Chambersburg, Pa.
(Please Mention this Paper.)

Blue Grass Route of Ohio

TIME TABLE.

In effect May 28, 1883.

The Cleveland, Mt. Vernon and Delaware RAILROAD.

GEO. D. WALKER, RECEIVER.

SOUTH-BOUND TRAINS.

	Mail.	Expr'ss.	Acc'm	Acc'm
Leave.				
Cleveland	8 25 am	2 30 pm	3 45pm	.....
Hudson	9 40	3 35	5 00	.....
Cuyahoga F's.	9 58	3 53	5 24	.....
Akron	10 14	4 08	5 40	.....
Clinton	10 46	4 44	6 11	.....
Warwick	10 51	4 49	6 16	.....
Orrville	11 25	5 32 S	6 40	.....
Fredricksburg	11 55	6 02	7 13	.....
*Holmesville	12 05	6 12	7 23	a. m.
Millersburg	12 18	6 25	7 35	5 25
*Killbuck	12 31 pm	6 38	.....	5 38
Gann	1 08	7 15	.....	6 35 B
Danville	1 19	7 26	.....	47
Gambier	1 30	7 46	.....	7 07
Mt. Vernon	1 49	8 00	.....	7 19
*Mt. Liberty	2 12	8 22	.....	7 40
Centerburg	2 24	8 34	.....	7 52
*Condit	2 38	8 48	.....	8 06
*Sunbury	2 48	8 58	.....	8 16
Westerville	2 09	9 19	.....	8 38
Columbus	3 35	9 45	.....	9 05

NORTH-BOUND TRAINS

STATIONS.	Expr'ss.	Mail.	Acc'm	Acc'm
Leave				
Columbus	7 10 am	12 10 pm	.....	5 20 pm
Westerville	7 35	12 35	.....	5 48
*Sunbury	7 56	12 55	.....	6 10
*Condit	8 06	1 04	.....	6 21
Centerburg	8 19	1 17	.....	6 35
*Mt. Liberty	8 30	1 28	.....	6 47
Mt. Vernon	8 53	1 49	.....	7 12
Gambier	9 05	2 00	.....	7 25
Danville	9 25	2 20	.....	7 46
Gann	9 37	2 32	.....	7 57
*Killbuck	10 14	3 08	.....	8 33
Millersburg	10 28	3 22	5 45am	8 45
*Holmesv'e	10 40	3 34	5 58	.....
Fredricksb'g	10 50	3 44	6 08	.....
Orrville	11 25	4 15	7 10 B	.....
Warwick	11 52	4 39	7 37	.....
Clinton	11 58	4 44	7 46	.....
Akron	12 32 pm	5 14	8 20	.....
C'yahoga F's	12 46	5 26	8 33	.....
Hudson	1 05	5 43	8 58	.....
Ar. Clevel'd	2 25	6 55	10 10	.....

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Following is the time in effect May 14, 1883, and until further notice:

GOING EAST.

	Local Pass'n'gr	Local Pass'ngr.	Con'eaut Accom.
Lv. Chicago	8 15 am	.....	.....
Ar. Valparaiso	10 05	.....	.....
" Ft. Wayne	1 30 pm	.....	.....
" New Haven	2 05	.....	.....
" West Leipsic	4 09	.....	.....
" Arcadia	5 10	.....	.....
" Fostoria	5 25	.....	.....
" Gr. Springs.	6 12	.....	.....
" Bellevue	6 40	.....	.....
Lv Bellevue	6 55	8 30 am	.....
Ar Cleveland	9 20 pm	10 55	.....
Lv Cleveland	.....	11 00	5 00 pm
Ar Painesville	.....	12 06 pm	6 15
" Ashtabula	.....	12 58	7 11
" Conneaut	.....	1 25	7 40
" Erie	.....	2 28	.....
" Dunkirk	.....	4 21	.....
" Buffalo	.....	6 00	.....

GOING WEST.

	Local Passn'gr.	Local Pass'ng r.	Con'eaut Accom.
Lv Buffalo	10 15 am	.....	.....
Ar Dunkirk	11 56	.....	.....
" Erie	1 35 pm	.....	Leave.
" Conneaut	2 53	.....	6 10 am
" Ashtabula	3 25	.....	6 39
" Painesville	4 19	.....	7 36
" Cleveland	5 25	.....	8 50
Lv Cleveland	5 30	7 15 am	.....
Ar Bellevue	7 55	9 30	.....
Lv Bellevue	.....	9 40	.....
Ar Gr. Springs	.....	10 07	.....
" Fostoria	.....	10 46	.....
" Arcadia	.....	11 00	.....
" West Leipsic	.....	11 58	.....
" New Haven	.....	2 05 pm	.....
" Ft Wayne	.....	2 20	.....
" Valparaiso	.....	6 25	.....
" Chicago	.....	8 20	.....

FOR ROCKY RIVER.

Commencing Sunday, June 17, 1883, trains between Cleveland and Rocky River, (on Sundays only), will run as follows:

WESTWARD.

Leave Cleveland—(Broadway Station)
8 15 a m; 9 50 a.m; 12 50 p.m; 4 10 p.m; 7 00 pm.
Pearl Street—
8 23 am; 9 58 am; 12 58 pm; 4 18 p m; 7 08 pm.
Lorain Street—
8 30 am; 10 05 am; 1 05 pm; 4 25 pm; 7 15 am.
Arrive River Bank—
8 55 am; 10 30 am; 1 35 pm; 4 50 pm; 7 40 pm.

EASTWARD.

Leave River Bank—
9 00 am; 12 00 noon; 3 20 pm; 6 00 pm; 8 20 pm.
Arrive at Cleveland (Lorain Street—
9 25 am; 12 25 pm; 3 45 pm; 6 25 pm; 8 45 pm.
Pearl Street—
9 32 am; 12 32 pm; 3 52 pm; 6 32 pm; 8 52 pm.
Broadway Station—
9 40 am; 12 40 pm; 4 00 pm; 6 40 pm; 9 00 pm.

Trains run by Columbus time, which is twenty minutes faster than Chicago, five minutes slower than Cleveland, and sixteen minutes slower than Buffalo time.

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Gen'l Passenger Agent,
LEWIS WILLIAMS,
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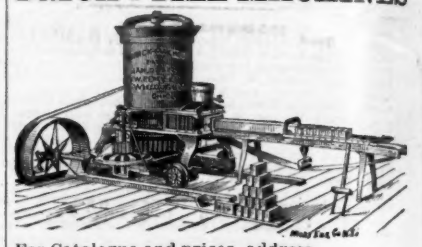

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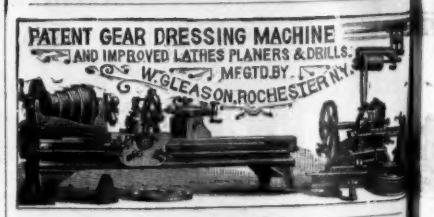

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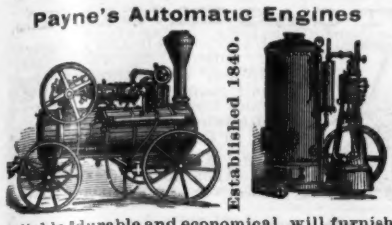

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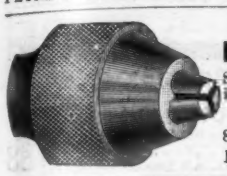

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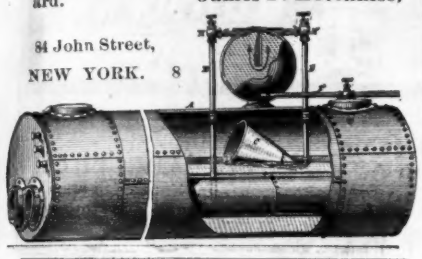

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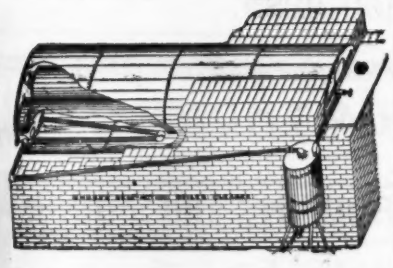

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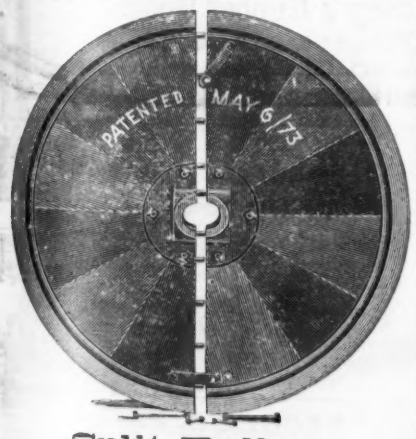

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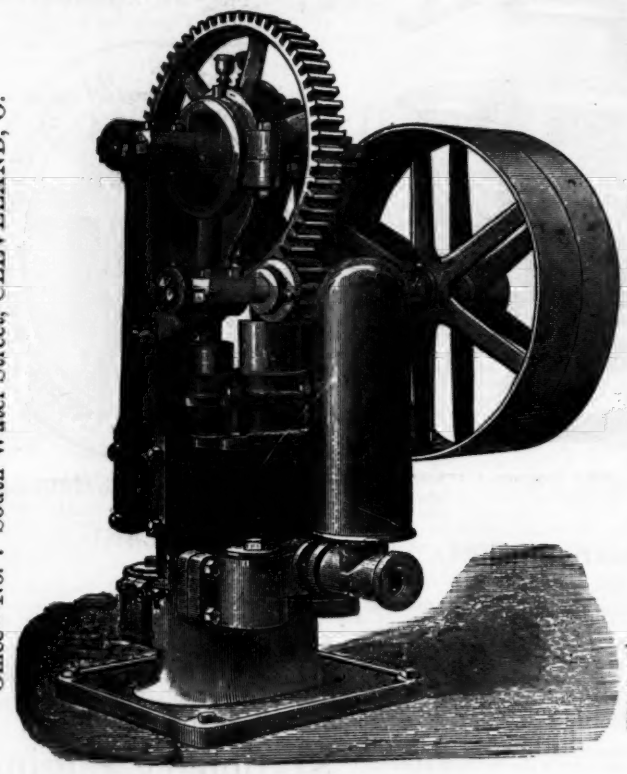

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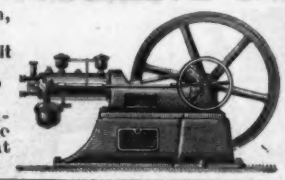

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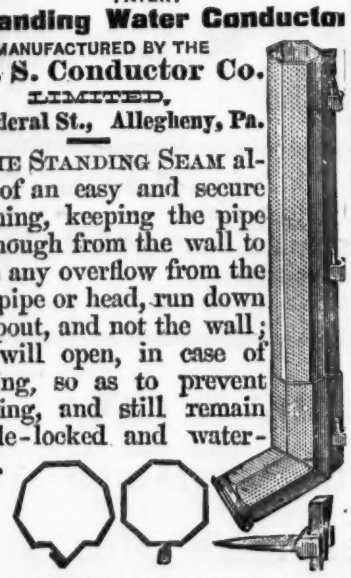

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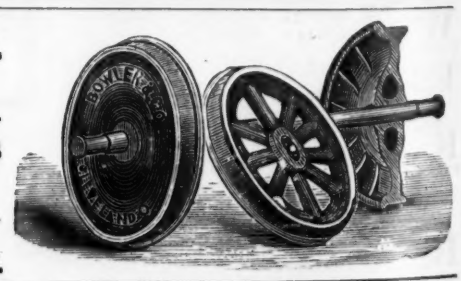

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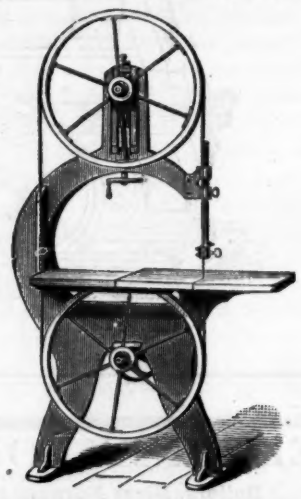

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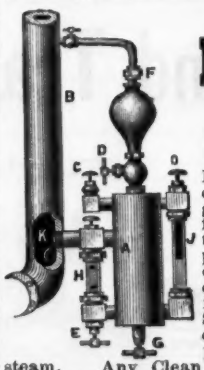

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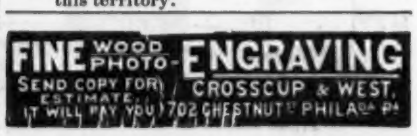

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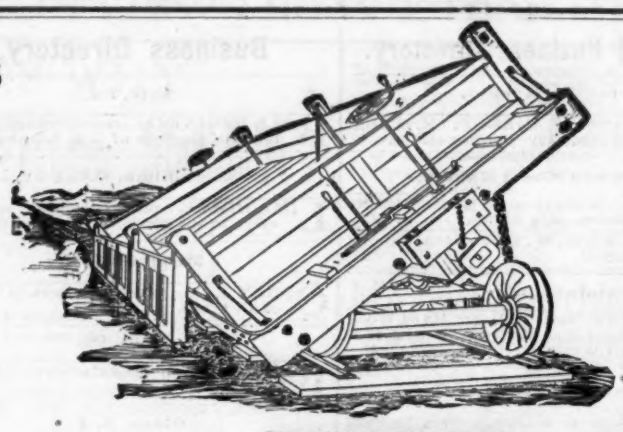

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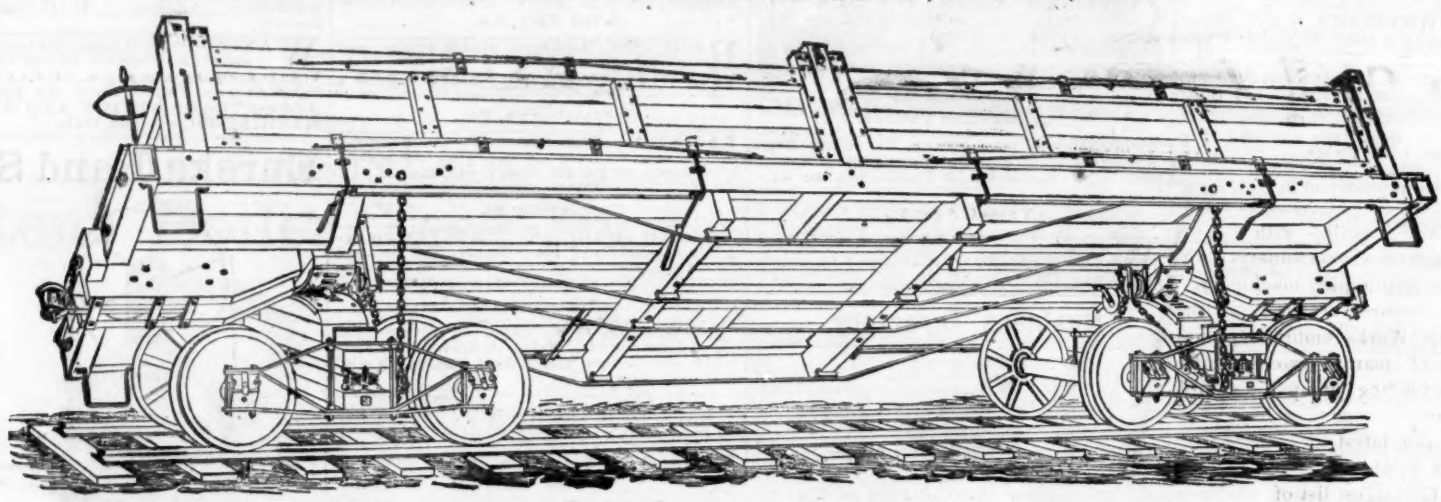

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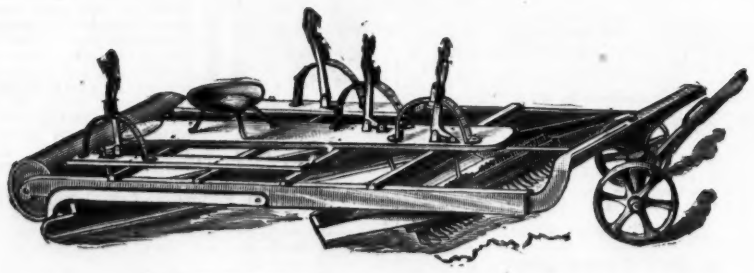

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